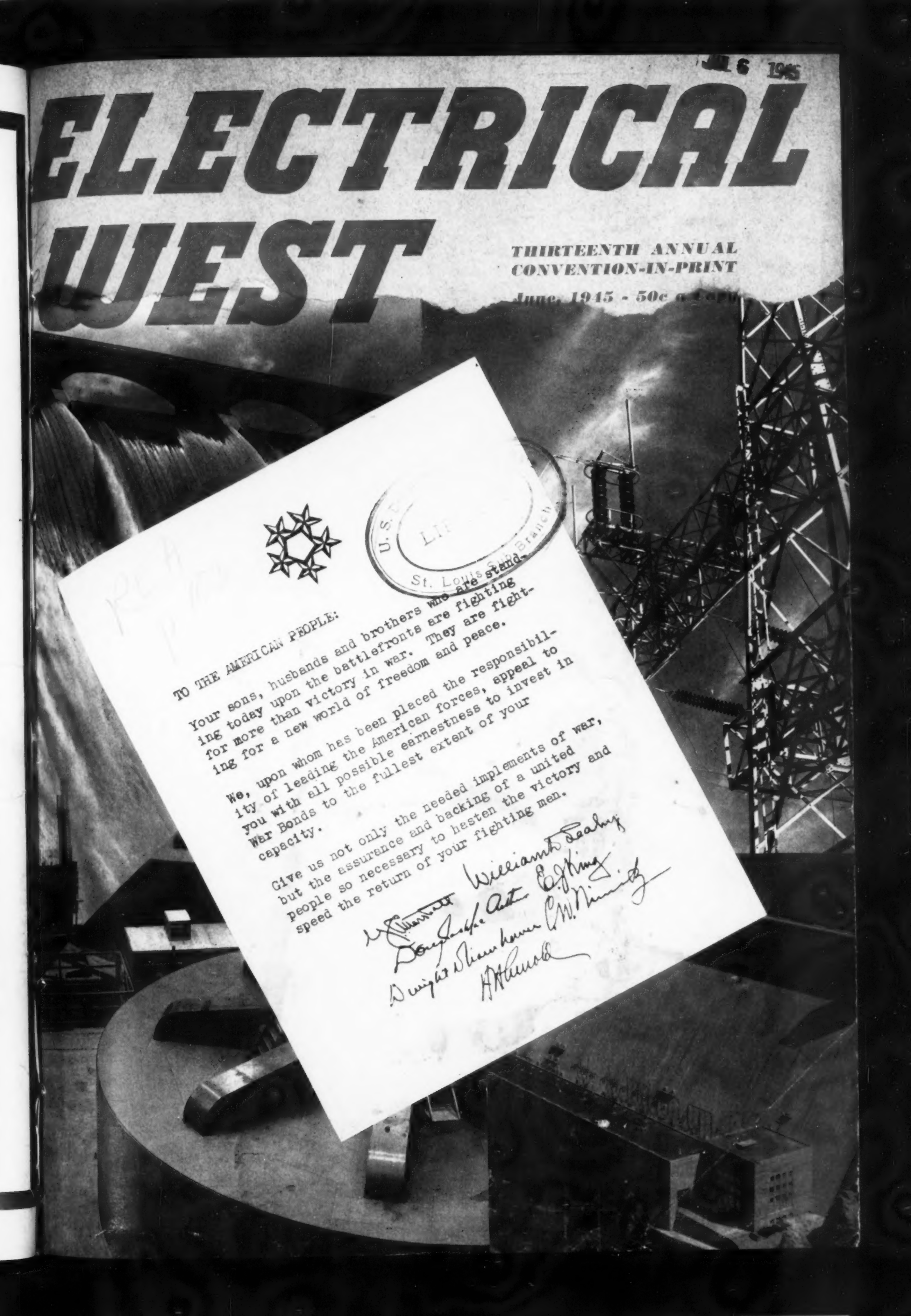
JUL 6 1945

ELECTRICAL WEST

THIRTEENTH ANNUAL
CONVENTION-IN-PRINT

June, 1945 - 50c a copy


TO THE AMERICAN PEOPLE:
Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.
We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.
Give us not only the needed implements of war, but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.
U.S.
St. Louis Sub Branch

MODERN STREET LIGHTING HELPS WIN "SAFE CITIES" AWARDS

CALIFORNIA SAFETY COUNCIL

First Award

City of Redondo Beach

For its outstanding record in traffic accident reduction during 1944, in cities of its class.

MADE AT UNIVERSITY CLUB LOS ANGELES, MARCH

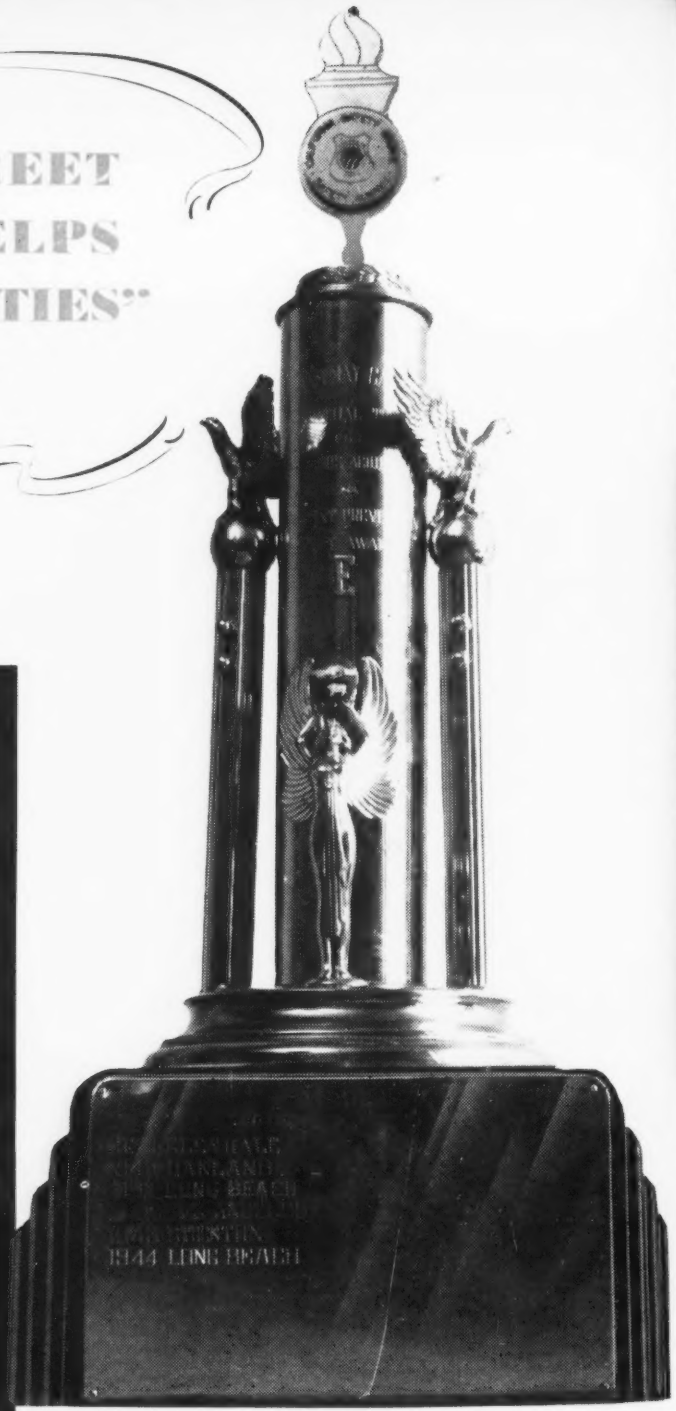
President

CALIFORNIA SAFETY COUNCIL

First Award

City of San Bernardino

For its outstanding record in traffic accident reduction during 1944, in cities of its class



Above, the Grand Prize, the "Safe Cities Trophy," won by Long Beach. Left, these awards were won by Redondo Beach and San Bernardino.

The cities of Long Beach, Redondo Beach and San Bernardino, all served by the Edison Company, recently won traffic safety awards of the California Safety Council. Long Beach won the Grand Prize, the "Safe Cities Trophy." Redondo Beach and San Bernardino were awarded citations for leadership of cities in their class. Modern street lighting was an important factor in the enviable safety records achieved by these cities.

The Edison Company consistently has encouraged and helped municipal authorities in Edison territory modernize street and highway lighting . . . one reason why so many communities in this area are "safe" cities.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), June, 1945. Vol. 94, No. 6. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rates—U.S., U.S. Possessions and Latin American Republics: $2, 1 year; $3, 2 years; $4, 3 years. Canada: $2.50, 1 year; $4, 2 years; $5, 3 years. Other countries: $3, 1 year; $5, 2 years; $6, 3 years. Single copy, 25c. Copyright, 1945. McGraw-Hill Company of California.

BUYING AN INSTRUMENT TRANSFORMER LIKE THIS...?

ITS ACCURACY CLASSIFICATION IS IMPORTANT!

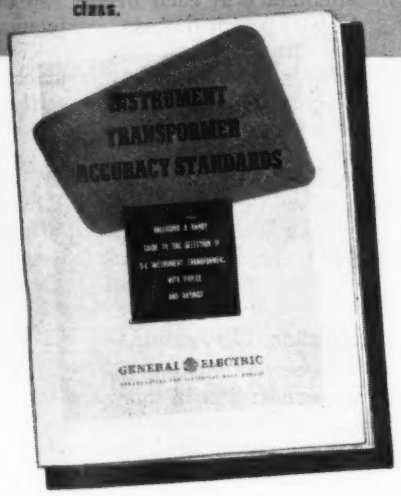
ASA Burden	B-0.1	B-0.2	B-0.5	B-2
ASA Accuracy Class	0.3	0.3	0.3	0.3

This means that, with standard ASA burdens, the ratio correction factor and the transformer correction factor will be within the limits of the ASA accuracy class 0.3.

NEMA Burden	X	Y	Z
NEMA Accuracy Class	¼	¼	¼

This means that, with standard NEMA burdens, the ratio error and the phase-angle will be within the limits of the NEMA ¼ accuracy class.

Type KF-316 current transformer, 34,500 volts, for accurate metering service and relay operation



FOR A BETTER UNDERSTANDING OF ACCURACY CLASSIFICATION

This publication explains the ASA accuracy standards for current and potential transformers and shows how they differ from the NEMA standards. Also, you will find this booklet a handy guide to the selection of G-E instrument transformers. Ask for your copy of GEA-4240 today. Address the G-E office nearest you.

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

ALL G-E instrument transformers are classified in accordance with the new ASA system, but to get the *right transformer* for your particular need, an understanding of this new system is very helpful.

For example, different applications often require different transformer characteristics. A transformer that is satisfactory for metering purposes (highest accuracy up to 100 per cent of its current rating) may not be satisfactory for relaying purposes where the *overcurrent* characteristics (currents as much as 20 times normal) must be considered.

The ASA system of accuracy classification has made possible the most precise method yet devised for selecting instrument transformers. A thorough knowledge of this system will help you in the selection of transformers with the most suitable characteristics for the job to be done. *General Electric Company, Schenectady 5, N. Y.*

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC

604-15-6400

ELECTRICAL WEST

VOL. 94 JUNE, 1945 NO. 6

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CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

In this issue, speakers are introduced by the chairman before each address, for this is a Convention-in-Print. Where no speaker is mentioned it is as though that feature of the program were presented in a moving picture or as a committee report.

Preview

Carry Over

One advantage of the Convention-in-Print is that it can be continuous, and another that even if you were not able to attend in person you can still derive the full benefit from it. The July number will carry over on both of these benefits.

PCEA Conferences

Wartime travel restrictions will limit attendance at each of the two Pacific Coast Electrical Assn. conferences, in Los Angeles and San Francisco, to those who can attend from close by without requiring hotel or travel accommodations. But the gist of what is said and done will be brought to all the other members of the PCEA, and indeed to the entire industry, by ELECTRICAL WEST staff reports. These will be a concise notebook of the entire proceedings.

Lighting Obligations

Received too late for printing with the convention in this issue was a very important paper on the responsibilities in the lighting field, by Harold Rankin, Public Service Co. of Colorado illuminating engineer. Always more progressive about new light sources than most utilities, his company's views should be read and thought about by all in the industry.

An issue packed with ideas and facts of value to everyone is in the making for the July number. More on electric heating, on high-frequency heating, on distribution costs, dealer views on utility merchandising, cold cathode lighting, and a "now it can be told" story on Douglas Aircraft's blackout plant, as well as departmental features are scheduled for that number. Keep tuned to ELECTRICAL WEST for industry-wide coverage.

Heavy Loads and Violent Surges Demand SA45's and AX5's

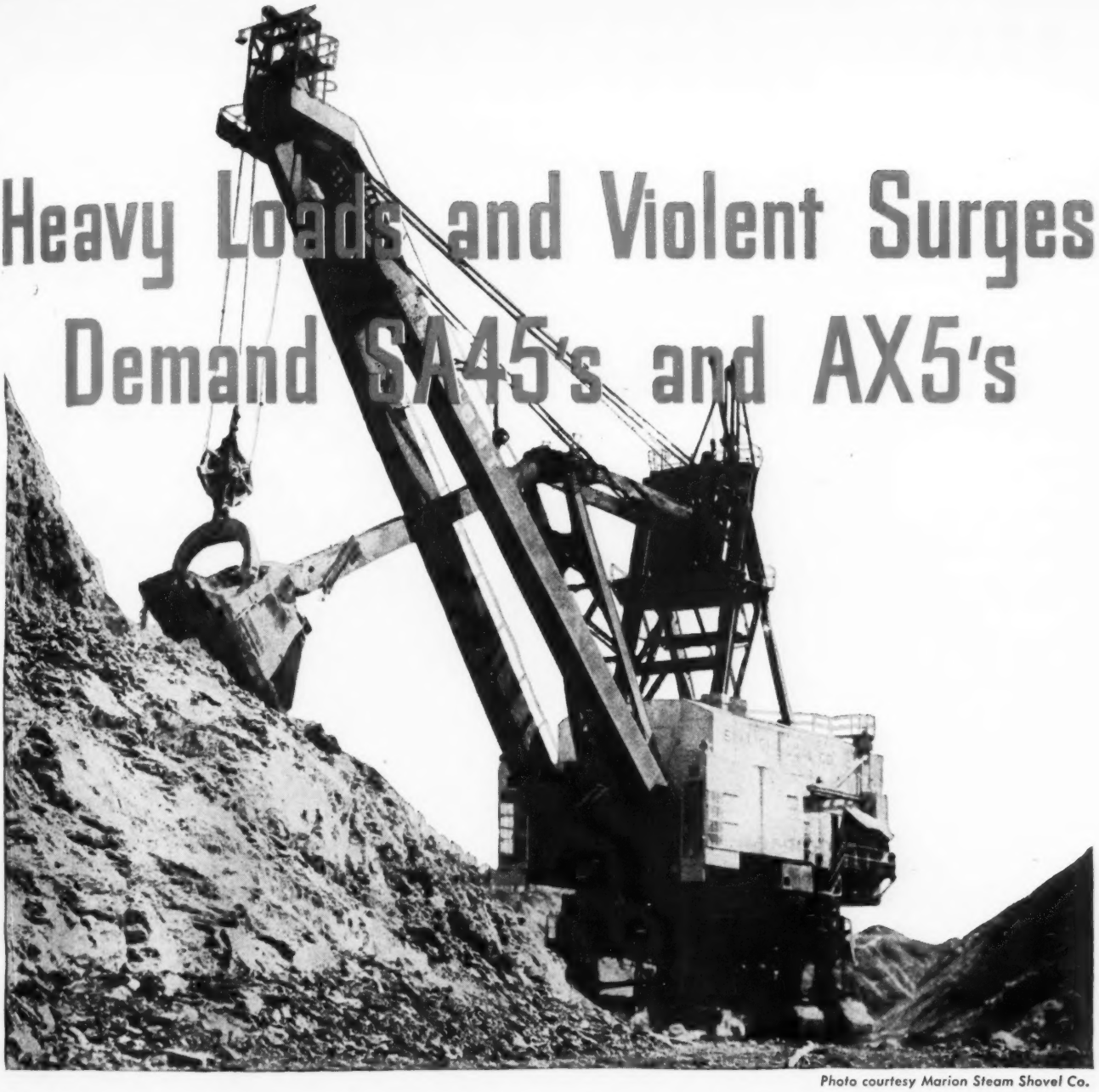


Photo courtesy Marion Steam Shovel Co.

CARBON brushes that are tough mechanically, and tough electrically, are necessary to keep giant 35-cubic-yard electric coal strippers working smoothly, efficiently.

"National" Grade SA45 brushes for the generators and Grade AX5 brushes for the motors are helping many of these giants maintain splendid performance records even in the face of extremely heavy loads, repeated current surges and continuous operation.

Grade SA45 brushes were developed for use where commutating conditions are especially severe, as on electric shovel generators and other D.C. generators, motors and rotaries requiring high commutating ability. The heavy-duty Grade AX5's are outstanding brushes for D.C. shovel motors, as well as for all classes of traction, mine and mill motors.

The long research and the manufacturing experience that have so well fitted these brushes to their jobs have also enabled National Carbon to develop brushes of high performance and efficiency ratings for all kinds and sizes of rotating electrical equipment . . . for any duty!

Whatever your brush problems may be, you are invited to call on our nearest Division Office for assistance.

The word "National" is a registered trade-mark of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

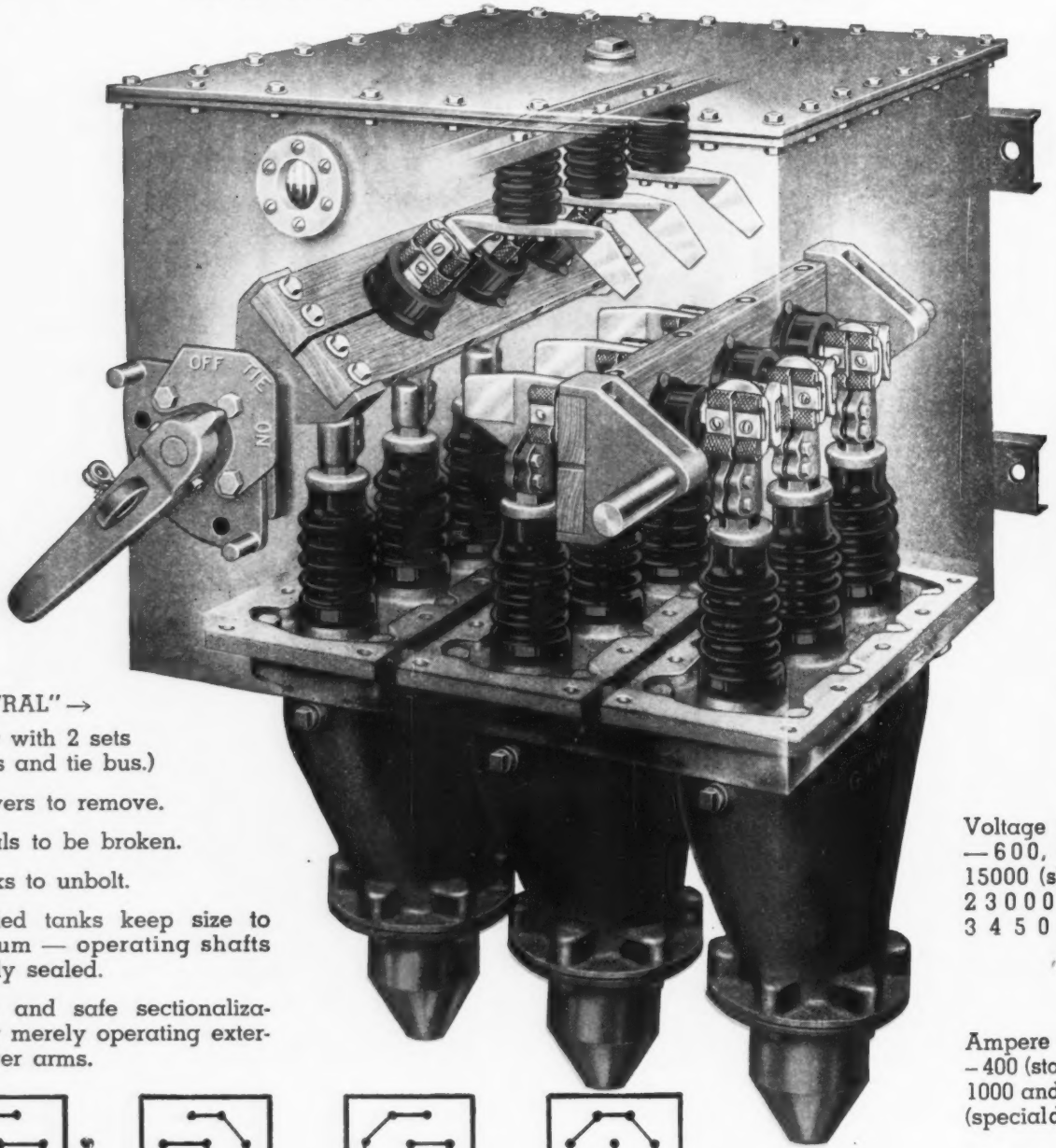
General Offices: 30 East 42nd Street, New York 17, N. Y.

Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

KEEP YOUR EYE ON THE INFANTRY . . . THE DOUGHBOY DOES IT!

QUICKLY ISOLATE *cable circuits with*

G & W TYPE "RA" OIL SWITCHES



TYPE "RAL" →
(3 way with 2 sets of links and tie bus.)

No covers to remove.

No seals to be broken.

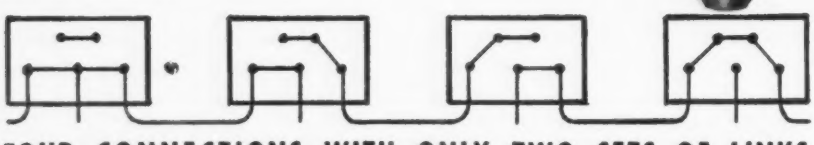
No links to unbolt.

Oil filled tanks keep size to minimum — operating shafts perfectly sealed.

Simple and safe sectionalization by merely operating external lever arms.

Voltage rating — 600, 7500 15000 (shown) 23000 and 34500 —

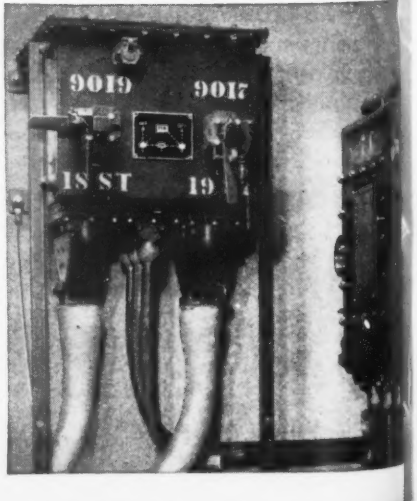
Ampere rating – 400 (standard) 1000 and higher (special design)



FOUR CONNECTIONS WITH ONLY TWO SETS OF LINKS

Type "RAL" three way switch, with two sets of gang-operated links and one set of tie busses, makes an ideal unit for use on loop systems.

It permits the loop to feed through with or without the branch connected, also to feed the branch from either side with the other side disconnected. Thus, any section of the loop can be isolated and any branch can be disconnected without affecting the continuity of the loop. This situation formerly required the use of three separate oil switches, involving a greater expense not only of the switches but also in the additional manhole or vault space necessary.



Send for new bulletin No. 743

G&W ELECTRIC SPECIALTY CO.

Cable Terminating, Sectionalizing and Protecting Equipment

7780 DANTE AVENUE, CHICAGO 19, ILLINOIS, U.S.A.

Representatives in Denver, El Paso, Los Angeles, Salt Lake City, San Francisco and Seattle

DISTRIBUTED ONLY THROUGH THE BETTER ELECTRICAL WHOLESALER

there is a leader commercial unit

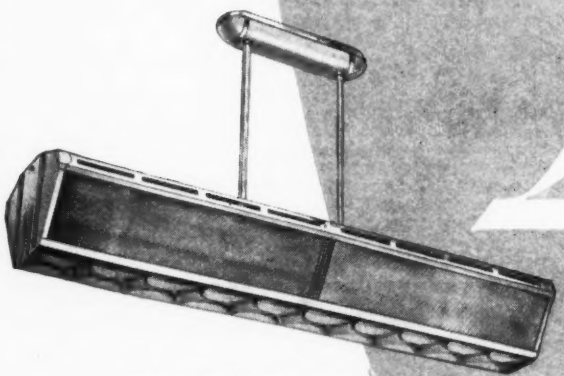
for every type installation

Is your problem low cost or simple streamlined beauty . . . fast easy installations or coordinated architectural design? Leader commercial fixtures can solve your problem.

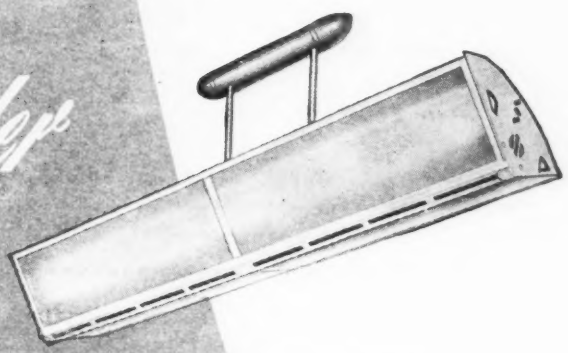
Leader units are specified and installed nationally by leading architects and engineers. Maintenance men find them easy to service, rugged, long lasting and efficient.

Straight line wholesale distributor merchandising methods plus full Leader cooperation assures maximum profits.

Descriptive literature furnished on request or contact a Leader representative.

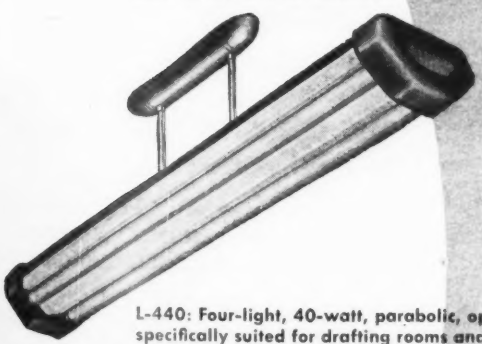


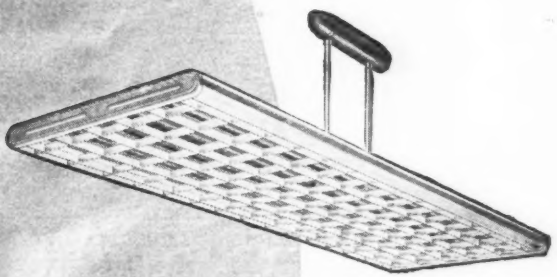
Leader



G-440: GLASS ENCLOSED LOUVER UNIT. This unit is especially designed for offices. Exclusive louver design permits full downward light output without side glare. Streamlined and more compact than similar units of equal light intensity.

GL-440: Four-light, 40-watt, glass enclosed louvered unit. A hinged panel with snap fasteners facilitates relamping and servicing. Designed for pendant suspension or ceiling mounting, constructed for individual or continuous run installation.





L-440: Four-light, 40-watt, parabolic, open type unit, specifically suited for drafting rooms and war production offices where general over-all light is required. Available for pendant or ceiling suspension mounting, continuous run or individual installation.

VL-440: THE LEADER OFFICER. Four-light, 40-watt, plastic enclosed, louvered unit, combining the finest in design, construction, and servicing feature, this unit offers the ultimate in lighting equipment. Available for pendant or ceiling suspension mounting, individual or continuous run installation.

LEADER ELECTRIC MANUFACTURING CORP. · 6127 BROADWAY · CHICAGO 40, ILL.

WEST COAST FACTORY

2040 Livingston Street, Oakland 6, California

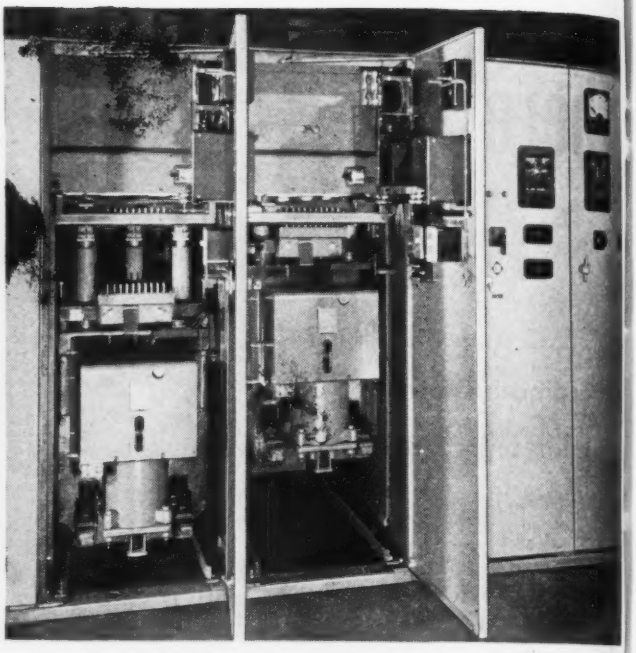
Here's Easy-to-Inspect

"Ruptair"

Circuit Breaker Contacts Ready for Inspection in

3 quick steps

NOTE: Inherently, this oilless breaker requires little maintenance . . . inspection is routine.



1 LOWER BREAKER

Photo shows "Ruptair" magnetic air circuit breaker in normal operating position (at right) and in the lowered disconnect position. The breaker is quickly and easily lowered with a manually or electrically operated crank-hoist.

FOR MODERATE capacity installations, 5 kv and below, the "Ruptair" magnetic air breaker is increasingly popular among operators. Because oil is eliminated from the breaker, fire hazard is reduced, and maintenance requirements are much less . . . particularly for repetitive operation.

In addition to these advantages, and simplest inspection of any magnetic air breaker, the "Ruptair" breaker combines vertical lift construction with horizontal contact separation, illustrated on opposite page.

"Ruptair" breakers are built in standard ratings of 5 kv, 150,000 kva capacity and below.

ALLIS-CHALMERS LETS THE CUSTOMER "HAVE HIS SAY"

You Can Choose From 3 Basic Types of Circuit Breakers

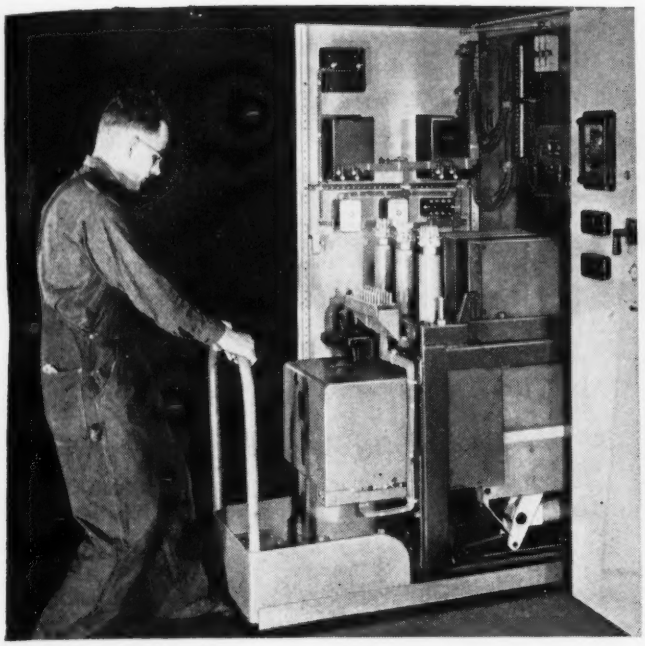
☛Allis-Chalmers wholeheartedly endorses the principle of standardization, wherever the interests of customers are best served. Actually, A-C *introduced* standard metalclad switchgear units to U. S. industry.

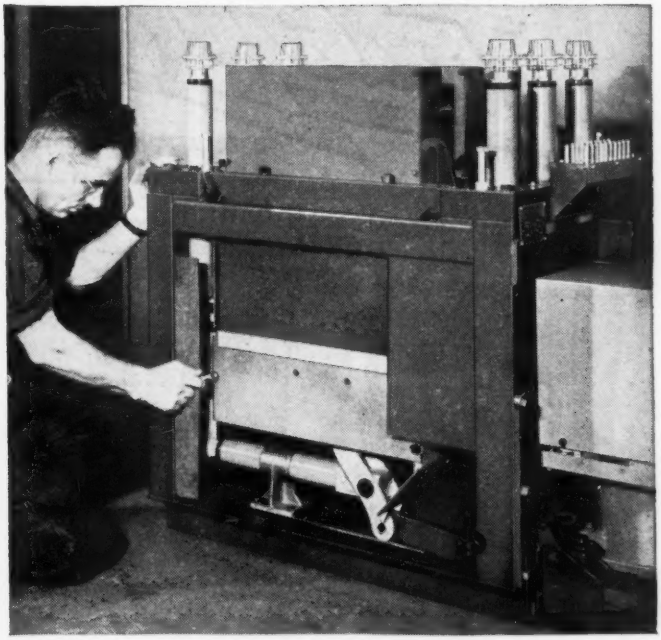
☛What Allis-Chalmers has *not* yet done is to limit *types* of circuit interrupters available in switchgear units. For our A-C engineers believe that the customer rightfully plays an essential part in the development of industrial equipment.

☛Take military aircraft as a parallel case to switchgear. A problem never really solved by the "efficient" German Luftwaffe—that of preparing planes for combat under current combat conditions — was licked by the U. S. Air Forces in a typically American way after Pearl Harbor, when pilot (customer) experience was utilized at Aircraft Modification Centers.

☛In the same way, by offering oil, magnetic air, and air blast breakers for buyer choice, A-C lets the customer "call his own tune" . . . cooperate in the *evolution* of tomorrow's circuit breaker.

Magnetic Air Breaker





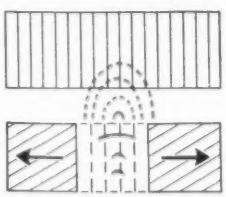
2 WITHDRAW IT

In the disconnect position, the "Ruptair" breaker can be placed on a transfer truck, and pulled out into the aisle. For safety, shutters used to isolate primary disconnect contacts are automatic in their operation.

3 REMOVE SIDE PLATES

Finally, light-weight insulating barriers are removed, each barrier being held in place by two cap-screws. Since the "Ruptair" arc chute is above the contact structure, it need not be disturbed for contact inspection.

"Ruptair" Circuit Breaker is Engineered For Maximum Interrupting Efficiency

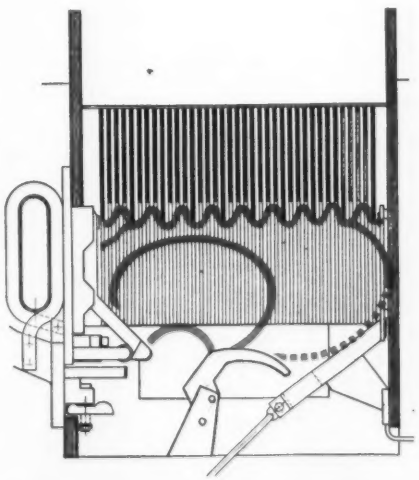


THE "RUPTAIR" breaker depends for efficiency over entire interrupting current range on several design factors . . . one of which is horizontal contact separation.

Since arcing contacts part in the horizontal direction, the arc is assisted into the arc chute by natural thermal effect — no complex interrupting structure is required! In addition, position of arc chute *above* contacts makes it possible to inspect the contacts without removing the chute.

By the coordination of contacts and arc runners, shown in the accompanying diagram, the arc is quickly and easily transferred from the horn-shaped moving contact to the stationary arc runner, opposite.

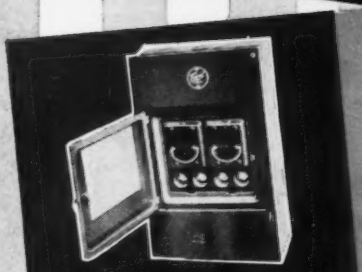
Another unique feature is the intermediate stationary contact which fully connects the magnetic blowout coil into the circuit before actual contact separation . . . results in augmented blowout effect.



ALLIS CHALMERS

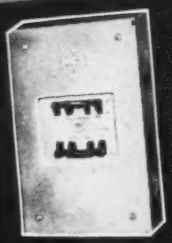
Milwaukee Wisconsin

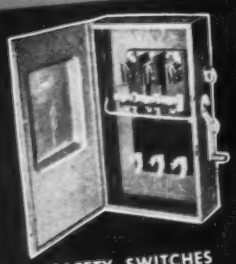
HERE ARE SOME OF THE
Federal
NOARK
ELECTRIC PRODUCTS
FOR THE CONTROL OF LIGHT AND POWER


SERVICE EQUIPMENT
All Sequences and Types for the Various Utility Requirements.

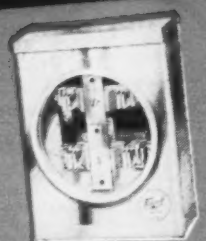
INDUSTRIAL CONTROLS
For Motors up to 50 H.P.

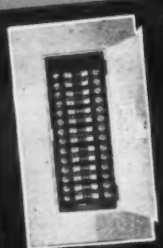
CONTACTORS AND RELAYS
From 1 to 100 Amperes.


MULTI-BREAKERS
For Home Lighting and Small Motor Circuits. Types MO, M, MB, M1, M2.


SAFETY SWITCHES
In Types A-C-D from 30 to 1200 Amperes Single and Double Throw.

TYPE AB-1 CIRCUIT BREAKERS
For AC and DC Lighting and Power Circuits.


METERING EQUIPMENT
Socket Type and Other Standard Designs of Metering Equipment.


PANELBOARDS
For Light and Power Distribution—Fusable and Circuit Breaker Types.

FEDERAL ELECTRIC PRODUCTS COMPANY, INC.
Executive Offices: 50 Paris St., Newark 5, N. J. • Plants: Hartford, Conn., Newark, N. J.
Manufacturers of Motor Controls, Safety Switches, Circuit Breakers, Service Equipment, Panelboards

PRODUCTS
that are news

Auto-Switch Capacitor (600)

A metal-enclosed auto-switch capacitor for distribution circuits has been developed by General Electric Co. This unit automatically switches 180 kva. of capacitance on or off the feeder in response to voltage requirements.

The equipment consists of a 180-kva., 2,400-volt delta or 4,160-volt, four wire or Gr. Y, three-phase group of Pyranol capacitor units, a three-pole solenoid operated oil switch, automatic voltage control devices and a potential transformer for supplying control power, as well as control potential for voltage responsive equipments. Although the standard equipment is designed for response to line voltage, current responsive equipments are available also.

Infrared Ovens (601)

A line of prefabricated infrared ovens for low-temperature, high-speed heating applications has been announced by Trumbull Electric Mfg. Co. "Raymersion" ovens are said to combine advantages of convection and zoned heat applications, and to reduce baking schedules as much as 90%. They are made up of standard parts and virtually any size, shape and heat capacity for any process or handling method can be built, according to the announcement.

Germicidal Lamp Unit (602)

Edwin F. Guth Co. has a new germicidal lamp fixture which it states is equipped with a highly concentrating alzak reflector and can be arranged to curtain off an entire area against outside germs. According to the announcement, it can be used to keep air-borne germs from food, milk bottles, slicing machines, etc., and also to protect offices and homes. It is available in two sizes, for use with 15- and 30-watt germicidal lamps.

Insulation Tape (603)

Irvington Varnish and Insulator Co. has developed a new transparent, flexible thermoplastic tape for electrical insulation and other uses. This Fibron tape is claimed to be heat sealing, flame resistant, flexible at low temperatures and resistant to acids, alkalies, moisture, oil, etc. With proper adhesives, it may be bonded to fabrics, metal, ceramics, wood and other materials, the manufacturer states.

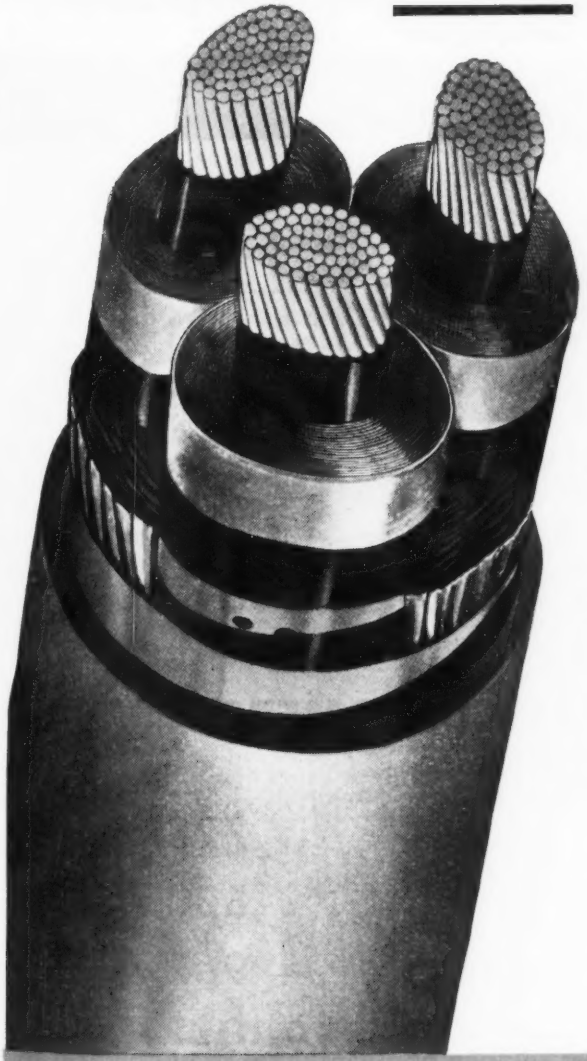
Resistance Tester (604)

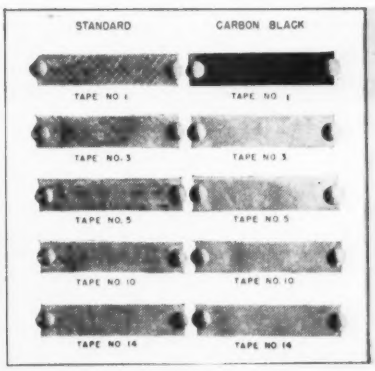
Shallcross Mfg. Co. is offering a new direct reading resistance measuring test set, No. 673-F. A medium range milliohmmeter (the six scales have ranges of 0-0.5-1-5-10-50 and 100 ohms full scale). The device is said to bridge the gap between the manufacturer's regular milliohmmeters for low resistance testing and the ohmmeters used for relatively high resistance measurements.

Electrode Holder (605)

An armor-clad, screw type electrode holder has been added to the G-E line. The holder is fully insulated and will accommodate electrodes up to and including ¼ in. diameter.

DON'T LET *Oxidation* BOOST YOUR OPERATING COSTS!





Ionization damage on paper tapes, standard model VS Type CB model

TYPE CB (CARBON BLACK) CABLE

HIGHLY ADSORBENT carbon-black paper in Type CB Cable effectively blocks the oxidation associated with ordinary oil-impregnated paper cables.

This *special* carbon-black paper actually purifies the oil—adsorbs oxidation products caused by heat, electrical stress. Naturally this construction assures longer cable life, more value for your cable dollar.

Ionization discharges are reduced, virtually preventing dendrites and wax formation in the cable. There is a definite over-all increase in cable stability.

There has not been a single report of electrical failure in any Type CB Cable in service. Ask to see graphic demonstrations of its all-round efficiency. 45304

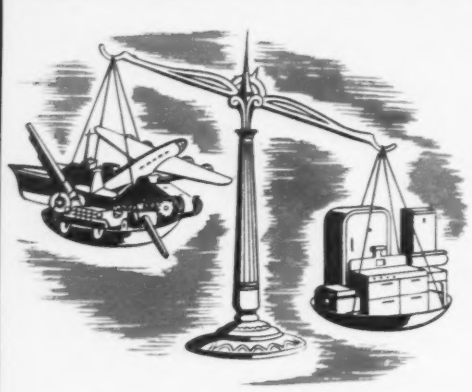
ANACONDA

Anaconda Wire & Cable Co.

GENERAL OFFICES: 25 Broadway, New York City 4 — *Subsidiary of Anaconda Copper Mining Company*

CHICAGO OFFICE: 20 North Wacker Drive 6 • Sales Offices in Principal Cities

In time of WAR prepare for PEACE...



Let's look at the FUTURE

The transition era approaches. Production of airplanes, ships, tanks and guns gradually will give way to increased manufacture of domestic electric appliances and the long list of other civilian necessities. Our studies of the territory we serve—Central and Northern California—lead us to the bright side of the postwar picture. They indicate prospective increases in population and in the number of electricity users.

POPULATION

P. G. and E. Territory

1940 (Actual)	2,956,000
1944, December 31, (Estimated)	3,456,297
1950, December 31, (Estimated)	3,843,918

Increase over 1940—30%

DOMESTIC ELECTRIC CUSTOMERS

P. G. and E. System

1940, December 31	728,303
1944, December 31	830,733
1950, December 31, (Estimated)	967,706

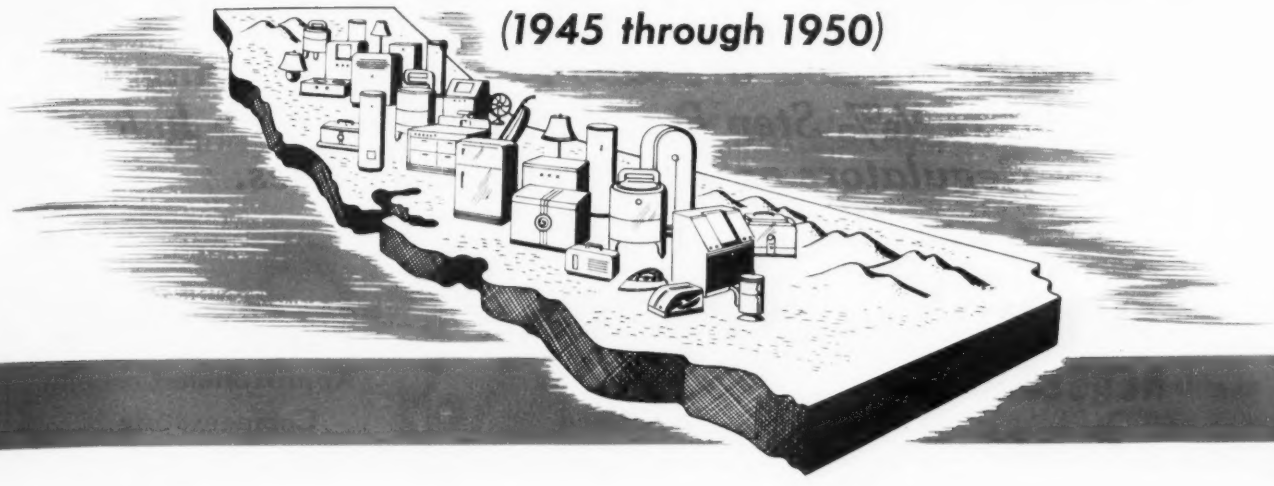
Increase over 1940—33%

★ ★ ★ ★ ★ ★ P·G·and E·

$285 Millions

POTENTIAL ELECTRIC APPLIANCE MARKET

(1945 through 1950)



A conservative estimate of the possible 6-year post-European-war demand for the 14 major electric appliances, based on studies of appliance saturation, population and all other factors. Dollar values are calculated at 1941 prices and are exclusive of installation costs.

Appliance	Number of Units	Retail Dollar Value
Ranges	88,886	$ 14,221,760
Water Heaters	51,267	3,229,821
Major Air Heaters	44,588	1,649,756
Refrigerators	499,260	78,383,820
Washing Machines	528,219	40,144,644
Ironers	194,917	15,008,609
Vacuum Cleaners	566,028	25,471,260
Radios	1,268,358	63,417,900
Room Coolers—Evap. Type	61,244	3,735,884
Room Coolers—Comp. Type	10,831	3,790,850
Domestic Pressure Systems	34,375	5,156,250
Dishwashers	61,459	13,029,308
Home Laundry Dryers	33,830	4,905,350
Home Freezers	71,031	13,140,735
Total		**$285,285,947**

Pacific Gas and Electric Company is preparing for substantial growth of the domestic load as resumption of manufacturing enables the suppliers to meet the pent-up demand created by wartime scarcities. We were ready for war with adequate power for all the war industries; we shall be equally ready for peacetime requirements.

PACIFIC GAS AND ELECTRIC COMPANY

Regulator Economy Chart TELLS THE STORY

Tabulated below are savings you get by using Allis-Chalmers 5/8% Step Regulators rather than Induction Regulators on 2400 volt feeder lines.

2400 VOLT REGULATOR RATING	POWER SAVINGS (Reactive Kva Eliminated From Lines)	DOLLAR SAVINGS (Approximate Cost of Compensating Capacitors)
36 kva	6.1 kva	$37
48 kva	8.1 kva	$49
60 kva	10.2 kva	$61
72 kva	12.2 kva	$73
96 kva	16.3 kva	$98
120 kva	20.4 kva	$122

BECAUSE of the magnetic gap between rotor and stator, induction regulators need about *three times* as much excitation as the Allis-Chalmers 5/8% Step Regulator.

Conversion of this additional exciting current into revenue-producing loads can be accomplished in two ways: 1) By installing capacitors — which may cost about $6 per kva, or 2) By use of Allis-Chalmers DFR Regulators instead of induction regulators. The above chart demonstrates the savings you get by employing the *second method.*

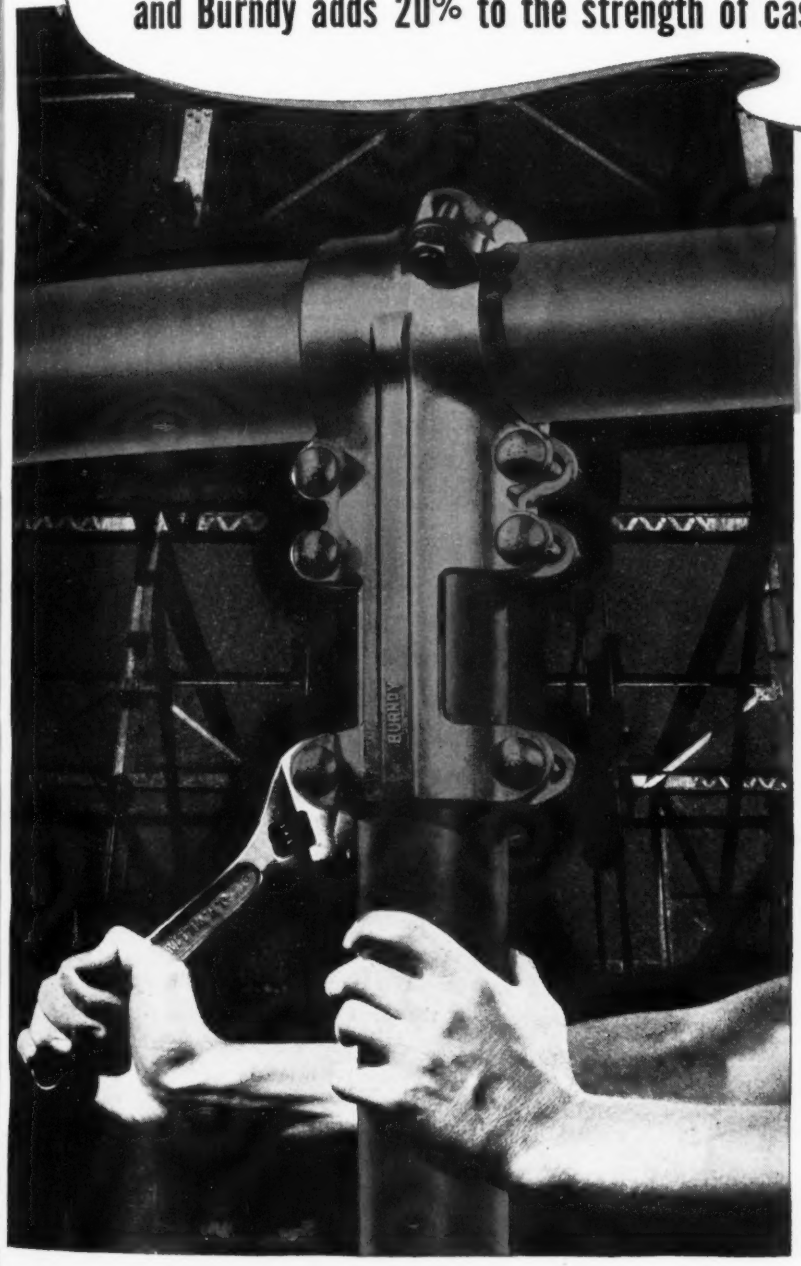
Further advantages of Allis-Chalmers DFR 5/8% Step Regulators for low voltage, single-phase feeders: No hunting or overshooting; quieter operation; voltage integrator and Feather-Touch control, providing better average regulation than any other type of feeder voltage regulator.

To get the full story on A-C feeder voltage regulators, call on our nearby district office, or write for Bulletin B-6065 and B-6056A. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 1825

ALLIS-CHALMERS *5/8% STEP REGULATORS*

A TRACE OF Li*

and Burndy adds 20% to the strength of cast electrical CONNECTORS



Continuing its leadership in connector development, Burndy now supplies cast electrical connectors made from Burndy alloy #113L . . . a new high-copper alloy containing *Lithium. This important addition of Lithium, in correct amount, provides denser, finer grained castings . . . with tensile strength increased 20%, elongation increased about 20%, and coefficient of friction materially reduced.

Thus today, Burndy cast electrical connectors provide an even *greater* margin of superiority than in the past. Far stronger and tougher, they can be installed with greater applied pressure, and are more readily conformable to the conductor . . . assuring a tight, durable, full-contact-area connection.

For complete information on these or any other type of electrical connectors, write connector headquarters . . . Burndy Engineering Co., Inc., 107-V Bruckner Boulevard, New York 54, N.Y.

Headquarters for CONNECTORS

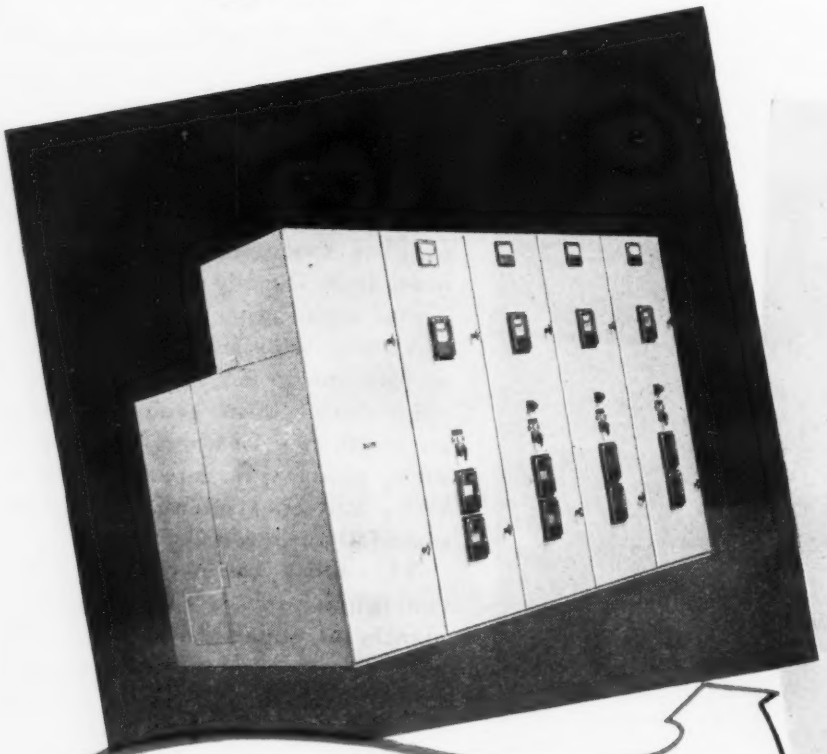
Burndy

In Canada: Canadian Line Materials, Limited, Toronto 13

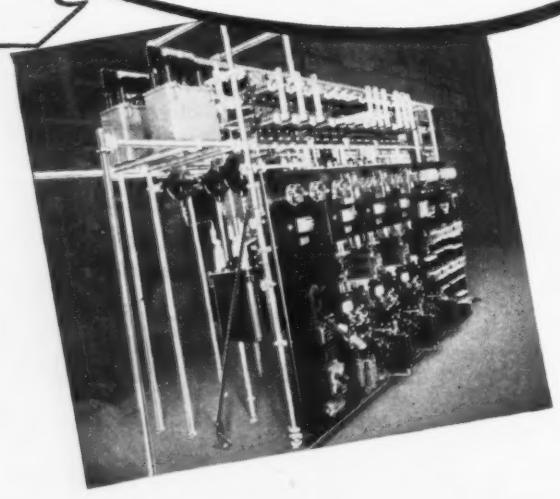
YOU GET ALL 5 WITH "UNITIZED"

★ **1.** Quicker ordering, manufacturing, shipment
★ **2.** Improved service continuity
★ **3.** Complete operating safety
★ **4.** Easy accessibility
★ **5.** Advanced manufacturing and design features

Save up to 30% of t



"UNITIZED" DESIGN (above) eliminates delays, hazards and complications of **PIECE-BY-PIECE ASSEMBLY** (below).



THE NEW TIMESAVING FLEXITEST RELAY CASE

It combines in one compact case, any Westinghouse protective relay or watt-hour meter with **KNIFE-BLADE TEST SWITCHES.** The **FLEXITEST** "two-in-one" Relay Case extends "Unitized" simplicity to maintenance and testing operations.

Test connections are easily made from the front by using a multi-circuit test plug or spring-clip leads. Relay is removable for bench or laboratory testing.

WESTINGHOUSE

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

f time formerly required

TO ORDER AND BUILD SWITCHGEAR

We don't claim that you can now order and install the switchgear for a plant or substation as easily as a safety switch, but "Unitized" Switchgear is a long step in that direction.

Complete standardization of ordering and manufacturing procedures, combined with stocks of standard parts and materials, simplify the job beyond anything previously available.

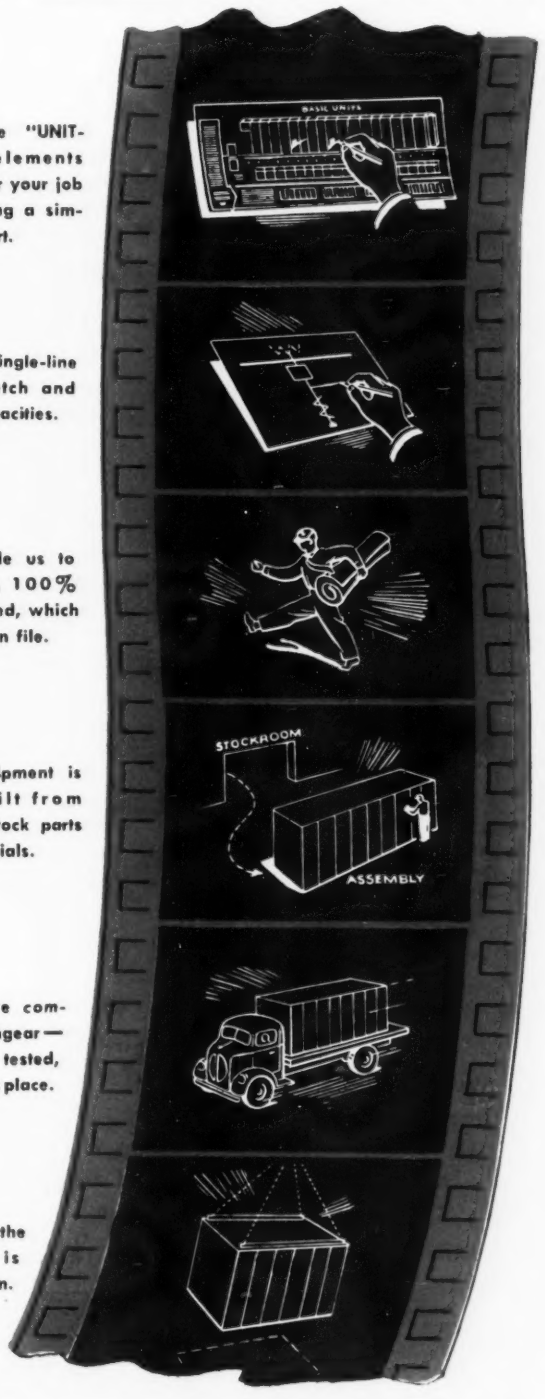
No need for extensive negotiations with separate manufacturers of individual components. No need for the painstaking, laborious selection and co-ordination of ratings. "Special" engineering is eliminated. The steps illustrated at the right reduce the job to its simplest terms.

For full information call your nearest Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

SEND FOR THESE BULLETINS

B-3036 is a complete illustrated manual of Heavy-Duty Air "Unitized" Switchgear. It describes equipment for 2500 and 5000-volt service; 600 to 2000 amperes; 100,000 to 250,000 kva interrupting capacity; draw-out air breakers.

B-3035—Heavy-Duty "Unitized" Switchgear up to 15,000 volts; 100,000 to 500,000 kva interrupting capacity; with oil breakers. J-60593


Select the "UNITIZED" elements needed for your job by checking a simplified chart.
Draw a single-line circuit sketch and specify capacities.
These guide us to drawings, 100% standardized, which we keep on file.
STOCKROOM
ASSEMBLY
Your equipment is then built from *standard* stock parts and materials.
You receive *complete* switchgear—wired and tested, ready to set in place.
Connect, and the complete unit is ready for operation.

"UNITIZED" SWITCHGEAR

WESTINGHOUSE "UNITIZED" SWITCHGEAR IS AVAILABLE WITH AIR OR OIL BREAKERS TO MEET EVERY REQUIREMENT

KLEIN QUALITY

Safety engineers, purchasing agents and others interested in linemen's equipment can obtain a folder on "Klein-Kord" on request. Write for your copy today.

In the electrical industry—noted for its exacting demands for quality—it is significant that Klein pliers and equipment have remained the standard for more than three-quarters of a century.

And today—as when the first wires were strung—the name Klein still stands first with linemen and electricians who demand reliability plus a high factor of safety in the tools and equipment on which their very lives depend.

ASK YOUR SUPPLIER

Foreign Distributor: **International Standard Electric Corp., New York**

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3300 BELMONT AVENUE, CHICAGO 18, ILLINOIS

KLEIN TOOLS EST. 1857

Since 1857

Infrared Lamps (606)

Sylvania Electric Products recently announced new infrared lamps including four clear drying and three reflector drying types. Wattages on the new lamps range from 125 to 500 and applications include industrial heating services such as plastic and metal preheating, baking, drying and dehydrating.

The clear drying lamps have a constant heat center of 5¼ in. and change of oven temperature is possible by substituting lamps of suitable wattage. General specifications:

Bulb	Watts	Volts	Base
PS25	125	115	Medium
G30	250	115	Medium-skirted mechanical
G30	375	115	Medium-skirted mechanical
G40	500	115	Medium-skirted mechanical

Specifications for reflector drying types:

Bulb	Watts	Volts	Base
R40	125	115	Medium-skirted mechanical
R40	250	115	Medium-skirted mechanical
R40	375	115	Medium-skirted mechanical

Black Lamps (607)

Another Sylvania product now available is a black lamp for industrial, aircraft and marine instrument illumination. Operation is on 120-volt a-c and 24-28-volt d-c circuits. The near ultra-violet RP 12 is rated at 4 watts and is for use with a visible light filter; is equipped with a polarized bayonet

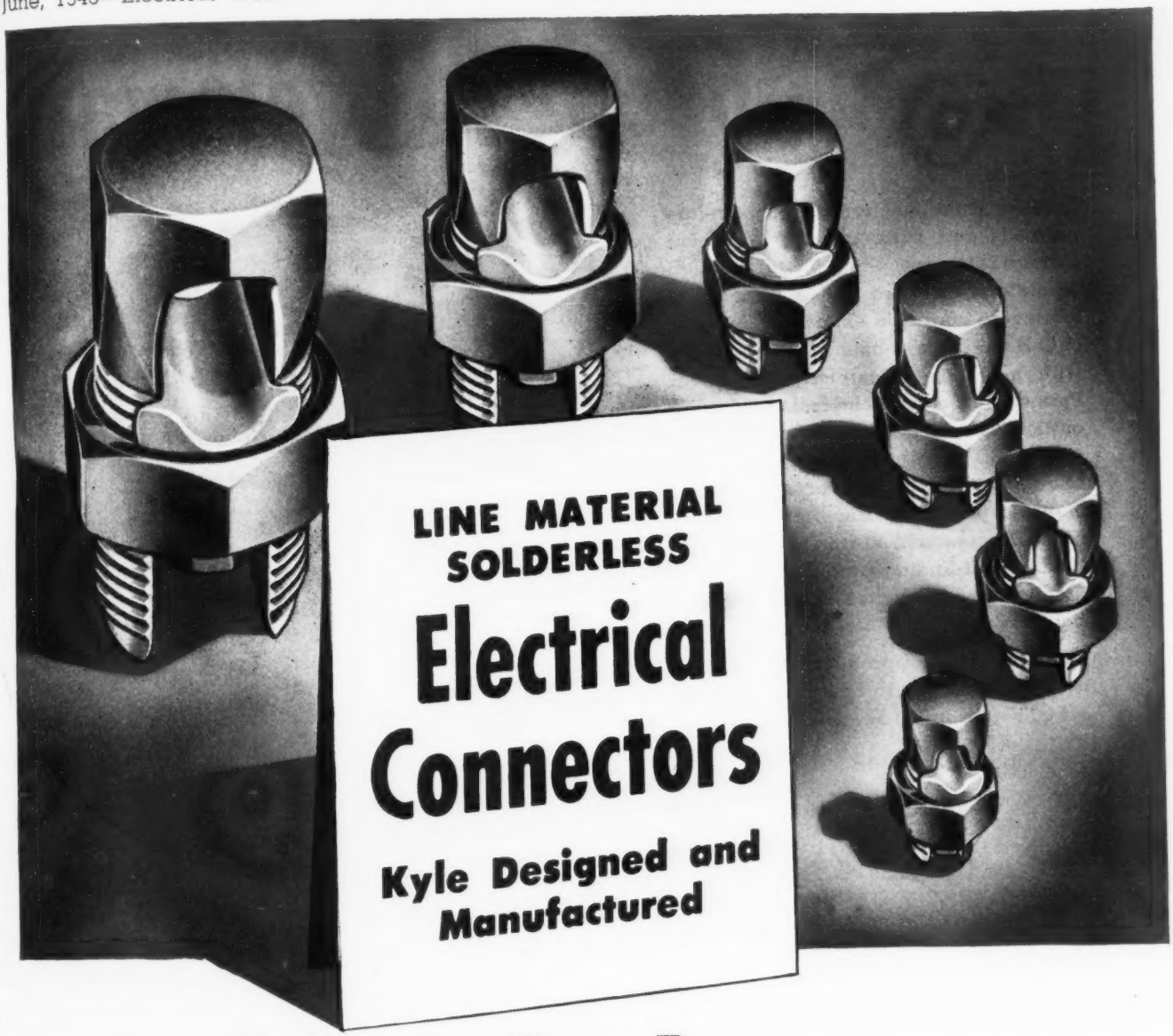
base and may be operated in any position. Red purple series tubular lamps require no visible light filter and operate with standard fluorescent lamp accessories on 120 volts a-c. They are supplied with miniature bi-pin bases in five sizes ranging from a 6-in. T5 4-watt to a 36-in. T8 30-watt unit.

Light Bulb Carton (608)

Sylvania is testing for postwar use a 5-pack carton for its light bulbs. The container, which capitalizes on the habit of buying eggs in molded cartons, is designed for convenience and to reduce breakage. Advantages to lamp retailers are the fact that it tends to increase unit sales, promotes self service and eliminates wrapping.

Thermostatic Switch (609)

A dual cam-adjusted thermostatic switch has been announced by the George Ulanet Co., for mounting on the bottom of electrically heated equipment where manual on and off knob is desired. The knob may be located any distance from the thermostatic element by lengthening the cam shaft. The pointer on the knob may be set at any desired temperature and the thermostat controls the heating element. This unit is available in three adjustable temperature brackets: 50° to 300° F., 50° to 450° F. and 50° to 700° F.; rated at 1,500 watts, 115-230 volts a-c.



hold tight because

★ HIGH PRESSURE GIVES TIGHTER WIRE CONTACT

★ HIGH COPPER CONTENT GIVES HIGH CONDUCTIVITY

★ MACHINE CUT THREADS GIVE HIGHER PERMISSIBLE TORQUE

IMMEDIATE DELIVERIES ON TYPES AND SIZES FOR EVERY REQUIREMENT

MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

KYLE Circuit Reclosers and Connectors are Designed and Manufactured for LINE MATERIAL COMPANY MILWAUKEE WISCONSIN

Can you Specify ALL you want

Located at the junction of two main-line railroads and surrounded by belching factory chimneys, the roof of the O-B laboratory provides a natural location for severe corrosion exposure. Samples of O-B metals have been placed on racks with each piece carefully identified. Periodic inspections and tests are carried out and recorded. Many items have passed 20 years. Findings are correlated with field data obtained at elevated potentials. Far better than artificial accelerated corrosion tests, this kind of fact-finding produces more authentic answers; better guides O-B design engineers.

Does this kind of product control furnish any answer as to how *you* may get *all* you want in hardware performance?

Built in 1917, this 132-kv., 17-mile line utilized 20,277 O-B suspension units. In the 28 years of its operation, outages have been extremely rare. No insulators have been removed from service due to any inherent defect.

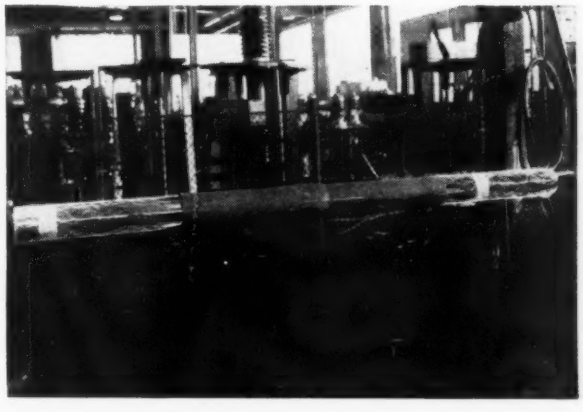
Does this kind of record furnish any answer as to how *you* may get *all* you want in reliable suspension insulator performance?

in an INSULATOR?

Rigid specifications and standards surround the manufacture of insulators, but can you specify *all* you want? You can call for M. & E. tests, wet and dry flashover results, and adherance to accurate dimensions, but these don't assure you of getting those qualities that make for long life and freedom from trouble. These things are the intangibles that depend upon men; not upon machines or materials. These are the intangibles that add up to the most tangible thing in an insulator--performance. How do you get it? Here are a few ways this is done.

Wartime power demands often result in operation of sub-station equipment at loads exceeding contemplated requirements. Many a power executive has wondered how well his bushings can take it. It is hard to anticipate or specify the reserve you want in a bushing, but the rugged porcelain inside O-B bushings has such reserve in abundance. Porcelain insulation has the unique property of sustaining a three-minute 60-cycle dry flashover of the insulating elements as a routine factory proof test.

Does this kind of construction furnish any answer as to how *you* may get *all* you want in bushing performance?



Switch and bus insulators are a highly standardized product--that is, highly standardized *when new*--but they don't stay new! O-B has operating records covering more than 30 years. A sizeable number of these old insulators remain in service today. Many thousands more have been added. All are being watched by their owners because of their critical service. Above all claims we might make rises this one fact: most orders come to us from present users, based upon their own operating records. When a man keeps coming back for more, he knows what he is getting.

Does this kind of buying furnish any answer as to how *you* may get *all* you want in station insulation?

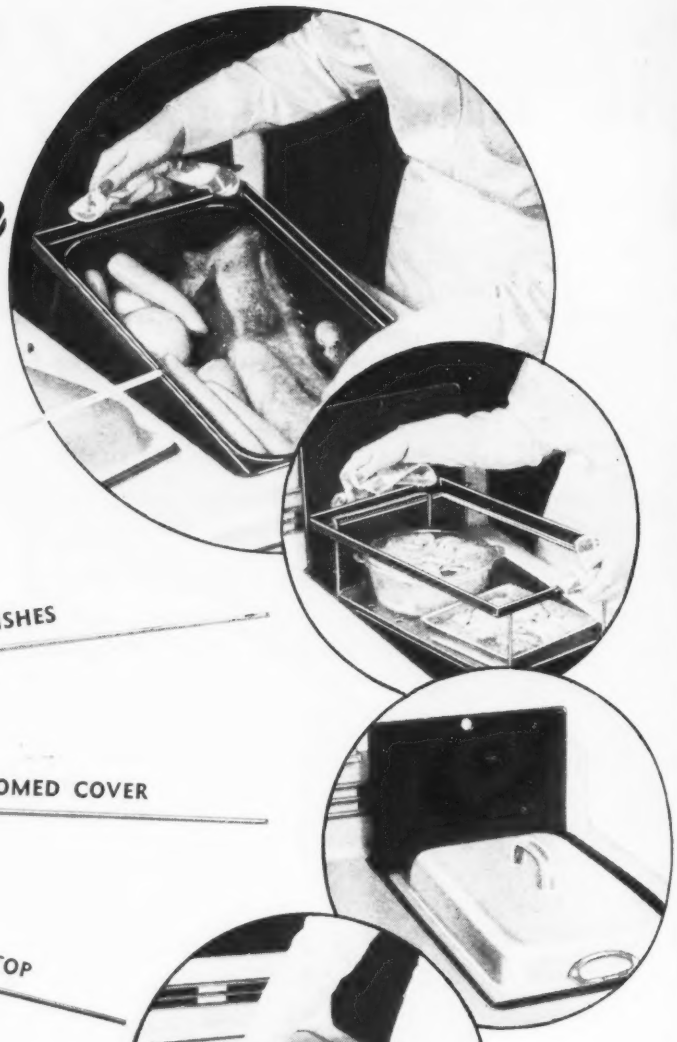
Ohio Brass

MANSFIELD, OHIO, U.S.A.

CANADIAN OHIO BRASS CO. LTD., NIAGARA FALLS, ONTARIO

KEEP BUYING WAR BONDS

NOW *is the time to decide*



COMPLETE MEALS

CASSEROLE DISHES

EXTRA HIGH-DOMED COVER

SMOOTH FLAT TOP

If you are already an authorized Monarch Electric dealer, you have the satisfaction of knowing that these exclusive Roaster Range features will be in YOUR post-war sales kit!

If you are not a Monarch dealer, and will have to COMPETE against this Monarch Roaster Range with a conventional type unit — now is the time to remedy your disadvantage. Write at once for exclusive dealer franchise.

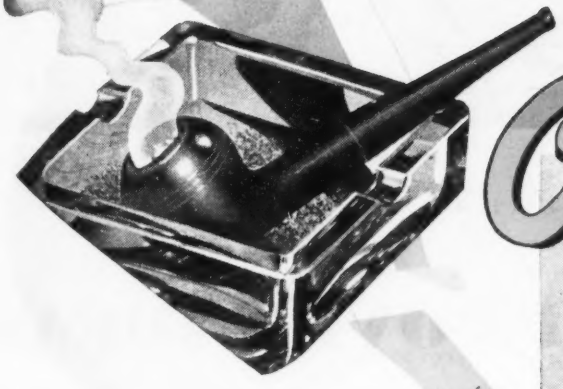
Provides auxiliary oven at cooking-top height in which complete meals may be cooked. Adds convenience and economy.

IF IT'S A
ROASTER RANGE
IT'S A
Monarch
ELECTRIC
PATENTED

MALLEABLE IRON RANGE COMPANY
3965 Lake St. Beaver Dam, Wis.

Thirty Years Ago

A DREAM CAME TRUE---

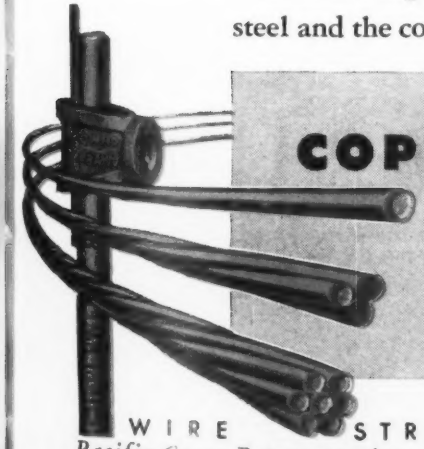


Copperweld presented the first successful copper covered steel wire

Combining The Strength of Steel with the Conductivity and Permanence of Copper

Since this dream became a reality, thirty years have passed—years of development and growth in the Power, Transportation and Communication Fields—years of steadily increasing demands for Copperweld Products made from copper molten-welded to a core of high-strength alloy steel.

Today, Copperweld power conductors, communication wires, ground rods, guy and messenger strands, overhead ground wires and signal bonds are contributing to the speed and power of our war activities. In the period ahead the intensified developments of research and the increased output of our expanded plant facilities will be at your service —to insure dependable performance wherever you need the strength of steel and the conductivity and rust-resistance of copper.



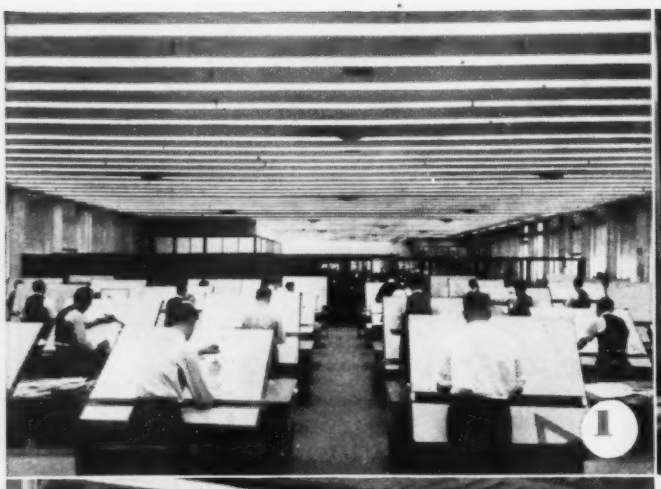
COPPERWELD STEEL COMPANY

ARMY E NAVY

GLASSPORT, PA.

WIRE • STRAND • GROUND RODS • SIGNAL BONDS

Pacific Coast Representative: C. E. INGALLS • RIALTO BUILDING • SAN FRANCISCO, CALIFORNIA

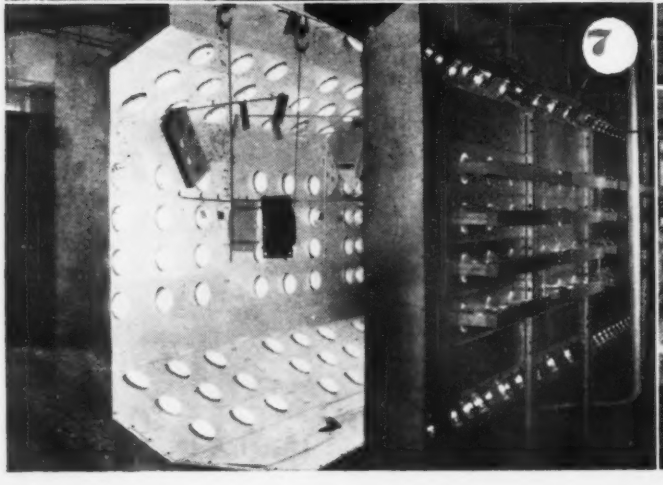


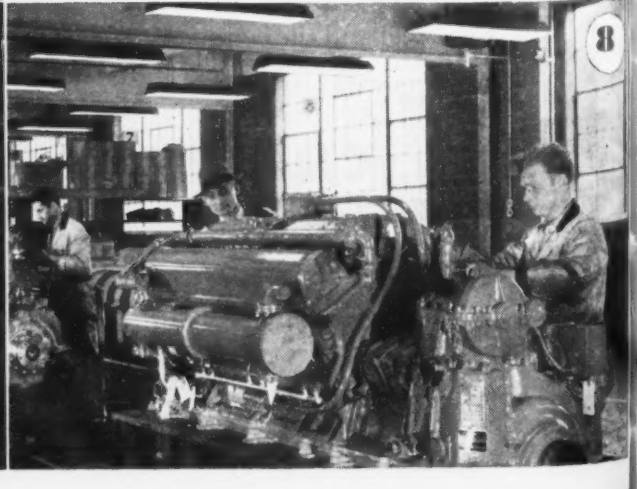
10 PROVEN IDEAS

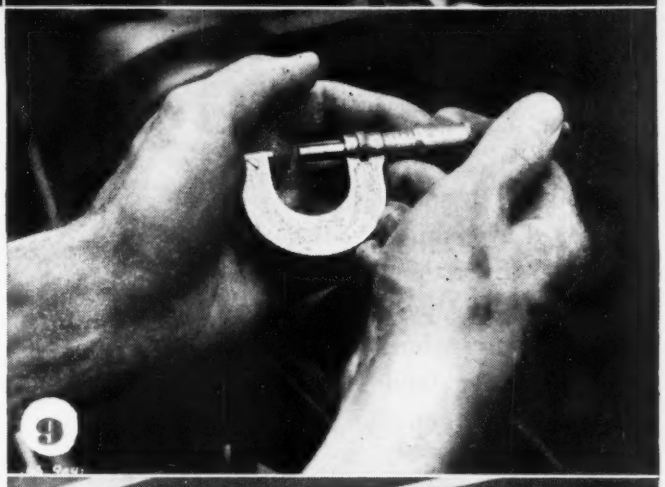
to increase plant output with G-E Mazda Lamps

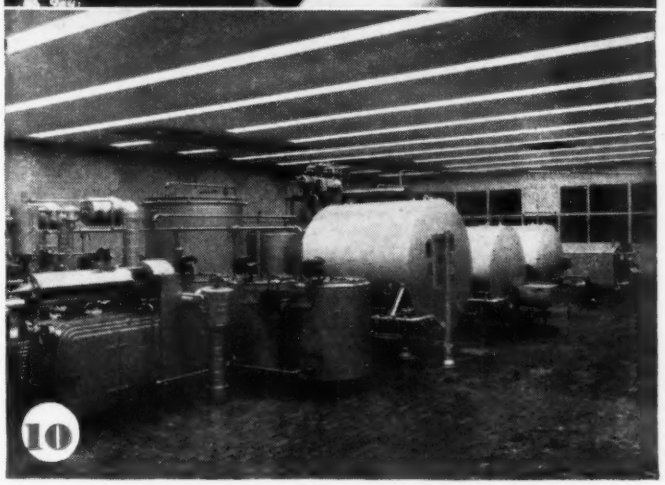
A leading wire manufacturer put in better lighting, found *production up 25%*. An electrical equipment maker installed G-E Infra-red Lamps, thus reduced drying time from *hours to minutes*. In shell manufacturing, G-E Mazda Lamps have cut inspection time — reduced eye-strain and fatigue and increased plant output.

Such results are not exceptional with engineered lighting—*plus* G-E Lamps. In the ten successful installations shown here, G-E Mazda Lamps provide high-efficiency, low-brightness illumination at low cost. You know where these ideas can help—why not put them to work?









1. Fewer mistakes in this *drafting room* because G-E Fluorescent lighting reduces shadows to a minimum.
2. *Safety hazards* are sharply reduced when G-E Mazda Lamps provide high-level illumination for safer seeing.
3. Extremely fine *detail work* moves faster, better, more accurately with abundant light furnished by G-E Lamps.
4. This *inspection* operation uses low brightness, high footcandle lighting to spot defects in steel ribbon.
5. High footcandles for close *assembly* work save rejects and reduce spoilage. G-E Mazda Lamps help do it.
6. Adequate *office lighting* with G-E Fluorescent Lamps provides better working conditions, raises morale.
7. Versatile G-E Infra-red Lamps save time—speed production in this oven *drying* installation.
8. Soft, diffused fluorescent light from G-E Lamps enables *supervisors* to maintain high standards of efficiency.
9. High *precision* depends on accurate readings. Abundant, glare-free lighting with G-E Mazda Fluorescent Lamps will make instrument reading easier.
10. With high levels of cool fluorescent light from G-E Lamps, this plant maintains *quality*, promotes cleanliness.

CONSULT your nearby G-E Lamp Office or your G-E Lamp supplier. More than 60 years of technical skill and engineering knowledge are available to solve your problems. Better call today.

"TO MAKE G-E LAMPS
STAY BRIGHTER LONGER"
The Constant Aim of G-E LAMP RESEARCH

G-E MAZDA LAMPS

BUY MORE WAR BONDS

GENERAL ELECTRIC

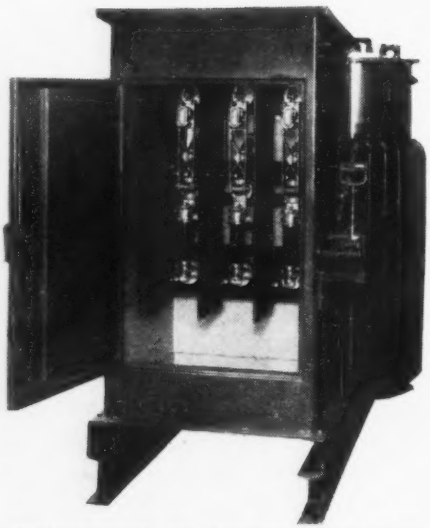
Hear the G-E Radio programs: "The G-E All-Girl Orchestra," Sunday 10:00 p. m. EWT, NBC; "The World Today" news, Monday through Friday 6:45 p. m. EWT, CBS; "The G-E Houseparty," Monday through Friday 4:30 p.m. EWT, CBC.

GARDNER

SMALL – COMPACT

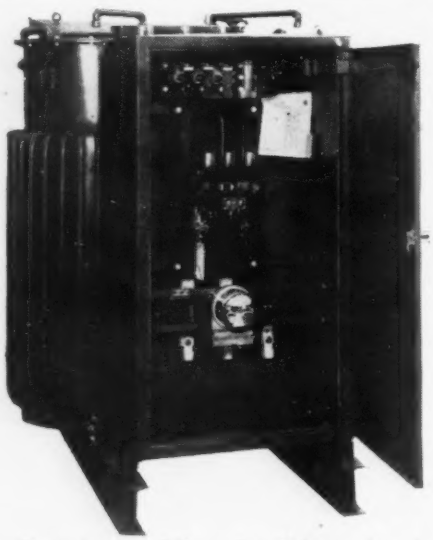
Unit Substations

To meet the growing demand for moderate size unit substation assemblies Gardner now offers units of the type shown. Assemblies are available in a wide range of sizes and voltages. Standard assemblies consist of Load Interrupter fused disconnects on the primary side of the transformer and circuit breaker, and metering equipment on the secondary side.



Cabinet-mounted Load Interrupter disconnects on primary side of Gardner 300 kva., three-phase transformer unit substation assembly.

Primary and secondary cabinets and Gardner three-phase transformer are mounted on sturdy I-beam rails for convenience in handling and installation.



Circuit breaker, C-T's, and metering equipment in secondary cabinet.

Gardner's policy of building to meet the users' needs makes these unit substation assemblies and other equipment available at competitive prices.

Let Gardner quote on your next job

GARDNER
Electric Mfg. Co.
4227 HOLLIS ST.
EMERYVILLE 8, CALIF.

REPRESENTED BY

MAYDWELL & HARTZELL
INCORPORATED
SAN FRANCISCO—LOS ANGELES—PORTLAND—SEATTLE

Resistors (610)

Ohmite Mfg. Co. has introduced two new series of precision resistors, 82 and 83. The new units are mounted by through-bolt; the 82 has two lug terminals at one end; the 83 has radial wire leads.

The 82 is available in three sizes, 11/16 in. diameter by 1⅛ in. long, 1 7/16 in. long or 1¾ in. long for the 2-, 4- and 6-pie units respectively. Minimum resistance is .1 ohm for all units and maximum is 400,000 ohms for the 2-pie, 750,000 ohms for the 4-pie and 1 megohm for the 6-pie unit.

The 83 is available in ½ in. diameter by 7/16, ⅝ or 1 in. long. The first two are 2-pie, the third 4-pie units. Minimum resistance is 10 ohms for all units and maximum is 200,000 ohms for the small 2-pie unit, 400,000 ohms for the large 2-pie unit and 800,000 ohms for the 4-pie unit.

Radio Tube (611)

Westinghouse has developed a 15,000-volt Thyratron power control tube providing split-cycle control of high power for radio frequency heating units and radio transmitters. Following is data on this new tube:

General Characteristics	55°C. Max. Thg.	50°C. Max. Thg.
Filament voltage	5.0 volts	5.0 volts
Filament current	7.5 amp.	7.5 amp.
Filament heating time (minimum)	1 minute	1 minute
Typical control bias at rated voltage	—50 volts	—75 volts
Maximum Ratings		
Anode voltage, peak forward	10,000	15,000
Anode voltage, peak inverse	10,000	15,000
Anode current, average	1.6 amp.	1.6 amp.
Anode current, peak	6 amp.	6 amp.
Temperature range, condensed mercury	25 to 55° C	25 to 50° C

Electric Alarm Clock (612)

Announced by Telechron for postwar manufacture is an electric alarm clock designed to time and control any household appliance which can be plugged into a conventional outlet. This selector unit will turn the radio on as an alarm to awaken the sleeper and will automatically switch on selected programs day or night. It can be used also to start a coffee percolator at a given time, switch household lights on and off, time roasting operations and defrost refrigerators. It has a switch mechanism rated up to 1,650 watts. It will retail for approximately $10 according to the manufacturer's announcement.

Connector Strip (613)

Aircraft-Marine Products Inc., is offering a connector strip for use with its solderless knife disconnect splicing terminals and claims that it permits quick assembly of any number of terminal connections on a single block of insulating plastic. Any knife switch connect end may be specified to accommodate any wire size from 22 to 10 inclusive, according to the manufacturer, and, where required, the opposite end may be made for a different wire size.

Telephone Type Relay (614)

Potter & Brumfield Mfg. Co. is offering a midget telephone type relay weighing 1¾ oz. Over-all dimensions, with two type C contact assemblies: length 1½ in., height 1-7/32 in., width 11/16 in. Operating voltage up to 6 volts d-c. Frames are provided with four mounting holes tapped 3-48, spaced ⅝ in. center to center.

CON-NEC-TITES

Save an Extra Connector On Every 2-Way Tap

KEARNEY
No. 4 and No. 6
CON-NEC-TITES
BUILT LONGER TO
HANDLE 3 CONDUCTORS
Kearney's strong hexagonal head provides firm wrench seating — prevents slipping.
Kearney's clean threads and correct slot width provide smooth engagement — prevent stripping and binding on conductors.
Kearney's long V-groove surfaces in washer and head assure maximum conductivity and eliminate bent conductors.
Kearney Thread Pilot makes possible easy starting. Elimination of excess threads makes possible easy removal of nut.
Kearney's rounded edges won't cut gloves or nick conductors.
2-WAY SERVICE
FORMERLY
REQUIRED
2 CONNECTORS

THE majority of 2-way service taps are made on No. 4 and No. 6 conductors. That's why Kearney Forged Con-Nec-Tites are made longer in these sizes — to handle three wires — to save an extra connector on every 2-way tap. As a result, Kearney No. 4 and No. 6 Con-Nec-Tites are real time and money savers.

Other Kearney Con-Nec-Tites from 1,000,000 CM to No. 10 will handle two conductors of any combination of copper, iron, or aluminum.

It will pay you to standardize on the complete line of Kearney Con-Nec-Tites.

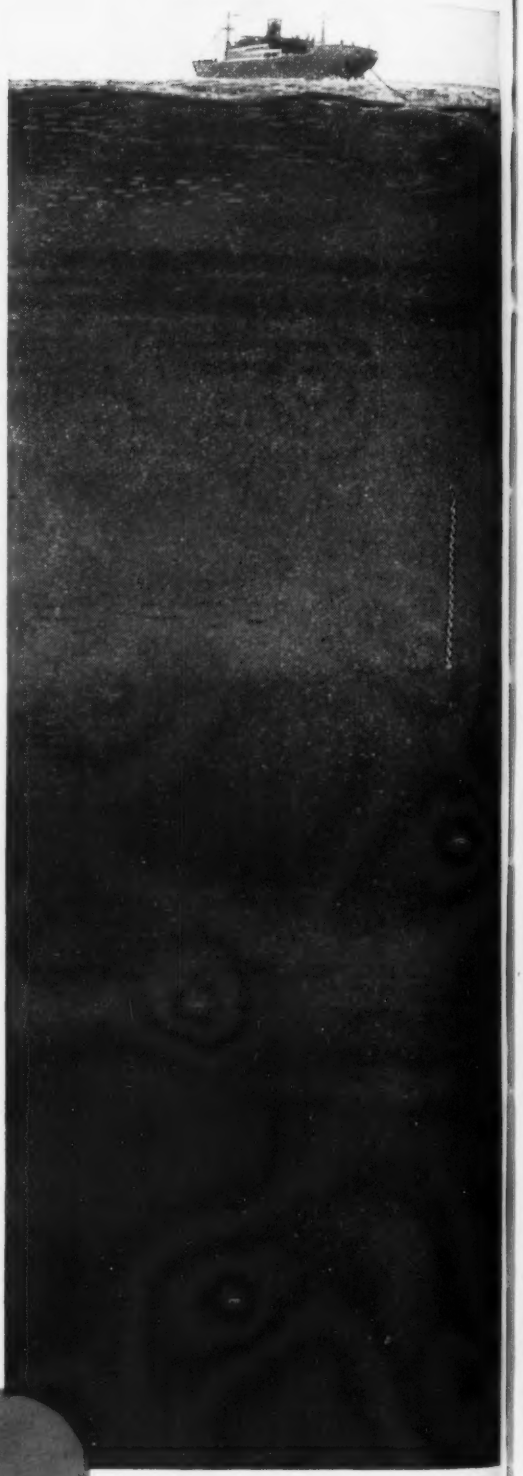
Makers of the Original Split-bolt Solderless Connector

JAMES R. KEARNEY CORPORATION

OVERHEAD **UTILITY EQUIPMENT** UNDERGROUND

4224-42 CLAYTON AVE., ST. LOUIS 10, MO. • CANADIAN PLANT: LEASIDE, ONTARIO

The minnow that caught a shark



THERE'S a new kind of fisherman riding our ocean-going ships today, and he trolls for the gamest fish in the ocean . . . torpedoes! His line is a long electric cable. The bait is a super-sensitive hydrophone.

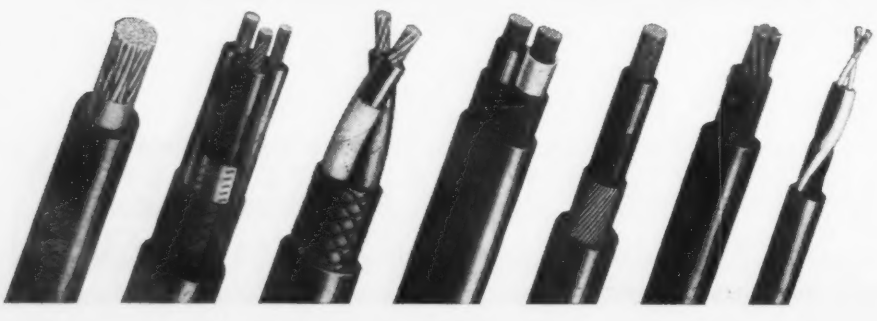
The advantages of a long hydrophone trailing cable are obvious. However, such forces as tensile load, tensile stress, vibration, hydrostatic pressure, corrosion, and water absorption conspired to compound troubles with early cables.

When this serious problem was brought to the attention of the American Steel & Wire Company, a special cable was developed by our engineers which was not only strong, but highly resistant to salt water. What's more, it was shielded against electro-magnetic disturbances that might reduce the hydrophone's effectiveness. The combination of conducting and high strength steel cords resulted in optimum electric and physical characteristics. This U·S·S Amerclad Cable has yielded infinitely better operating life.

In developing this cable the American Steel & Wire Company engineers combined their knowledge to insure satisfactory solutions to the many problems, utilizing the most modern facilities in the company's physical, chemical, and vibration laboratories.

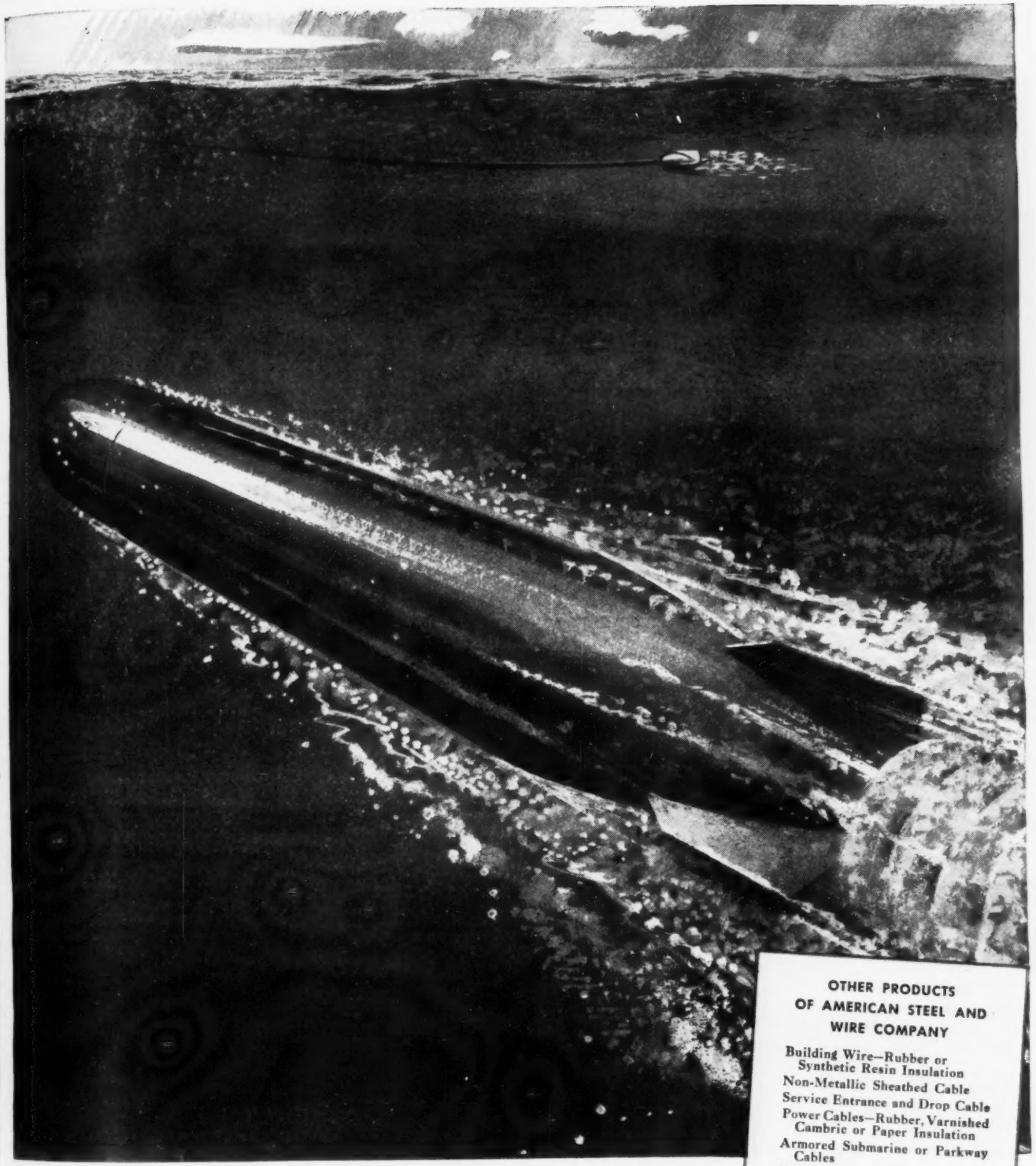
This is the kind of service that is yours for the asking. Almost 95% of all our cable products are tailor-made to meet particular specifications. No matter what kind of cable you need, bring your problems to us. We'll give you a straight answer as to what we can do for you.

AMERCLAD



BETTER ENGINEERED FOR THE TOUGH JOBS

Amerclad is a high-grade, rubber-jacketed portable cable. It has a wide variety of uses for products ranging from radar, vacuum cleaners, tools and mining machines—to locomotives. It can be dragged over rough, rocky terrain, through mud, oil, or water. It is armored with tough rubber like an automobile tire and can be shielded with semi-conducting rubber against electro-magnetic interference.



OTHER PRODUCTS OF AMERICAN STEEL AND WIRE COMPANY

- Building Wire—Rubber or Synthetic Resin Insulation
- Non-Metallic Sheathed Cable
- Service Entrance and Drop Cable
- Power Cables—Rubber, Varnished Cambric or Paper Insulation
- Armored Submarine or Parkway Cables
- Heatproof Asbestos Insulated Cables
- Weatherproof and Annunciator Wire
- Magnet Wire of all types and sizes
- Galvanized Steel Wire and Strand
- Rural Distribution Conductors

American Steel & Wire Company

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

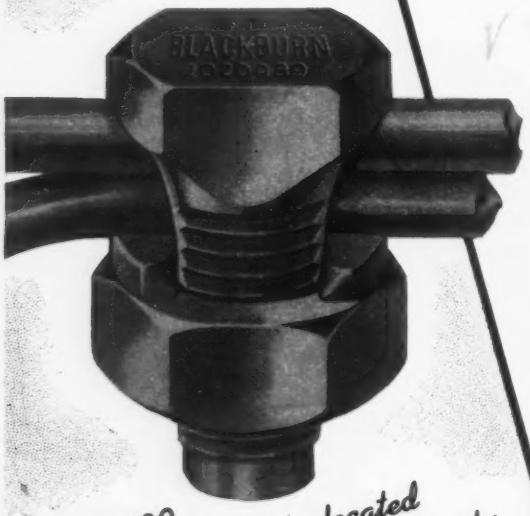
AMERICAN STEEL & WIRE COMPANY — USS STEEL — UNITED STATES STEEL

U·S·S AMERCLAD CABLE

Check These 7 Advantages of BLACKBURN Hi-Strength CONNECTORS!

- They're the strongest and most durable connectors made. That's because they're the only complete line of connectors made of DURONZE, which tests show is 75% stronger than hard-drawn copper, and more non-corrosive than pure copper.
- Because of this exclusive high-strength construction, BLACKBURN CONNECTORS will not distort, and can be used over and over again —a real economy.
- Conductivity of the joint is actually better than the solid wire itself.
- Reinforced pressure bar makes a strong connector still stronger.
- All corners rounded—will not nick wires or cut lineman's glove.
- Machined to close tolerances, assuring accurate fit of nut and maximum strength of thread.
- Full threads on screw for maximum strength.

In short, BLACKBURN Hi-Strength CONNECTORS are trouble-free on the line, and definitely cut your maintenance expense. Yet they cost no more than ordinary connectors.



Over 100 Conveniently-located Jobbers' Stocks

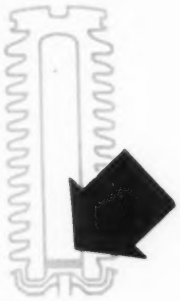
BLACKBURN Hi-Strength CONNECTORS

Builders of Quality Connectors for Over 10 Years

JASPER BLACKBURN PRODUCTS CORP.
Main and Clinton Sts., St. Louis (6), Mo.

HERE'S THE DOUBLE FACTOR OF SAFETY IN LAPP LINE POSTS AND STATION POSTS

POSITIVE PERMANENT SEAL



Lapp construction of Post insulators—for line and station use—is proved by a 15-year service record, during which Lapp Posts earned a reputation, *on actual record figures*, for most dependable performance under most difficult operating conditions. One reason is found in the exclusive Lapp construction features. Among these is a *porcelain-and-rubber plug,* inserted at the lower end of the finished porcelain, which permanently seals the interior against moisture.

NO HIDDEN CRACKS OR DEFECTS

The Post design is considered difficult of production because of the likelihood of internal cracks near the head of the insulator. Lapp production technique prevents this possibility. Each unit is fired as an open-end post; it is visibly inspected outside *and in;* and full flashover voltage is applied across the head section. This double factor of safety avoids puncture or flashover failure in Lapp Line Posts and Station Posts—assures dependable, economical performance on your system.

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, N. Y.

Cole Electric Co.

1510 South Los Angeles Street
PRospect 2068
LOS ANGELES 15, CALIFORNIA

•

POWER PLANT EQUIPMENT

AIR BREAK SWITCHES
MANUALLY OPERATED

AIR BREAK SWITCHES
MOTOR OPERATED

DISCONNECTING SWITCHES

BUS AND CABLE FITTINGS

BUS AND CABLE SUPPORTS

FUSE MOUNTINGS

FUSES

SWITCHBOARDS

INDUCTION RELAYS

MARINE EQUIPMENT

SWITCHBOARDS

ELECTRICAL EQUIPMENT RELAYS

AIRPLANE EQUIPMENT

BOMB RACKS

SWITCH HOUSINGS

THROTTLE SWITCHES

LIMIT SWITCHES

OIL FILLED SWITCH HOUSINGS

SWITCHBOARDS

RELAYS

•

Pacific Coast Representatives

EICHER & BRATT
Colman Bldg., Seattle 4, Washington • • Eliot 2722

EARL S. CONDON COMPANY
357 S. Hill St., Los Angeles 13, Calif. • • MI. 2831

Insect Repellent (615)

An "insect repellent" lamp has been announced by Solar Electric Corp. Especially designed for outside use, this lamp has a ceramic coating on the inside of the bulb, said to transmit only the yellow portion of the spectrum, which is less attractive to night flying insects.

Emergency Lighting (616)

An emergency lighting system has been announced by the Electric Cord Co. Called the Minuteman Light-Warden, this self-contained unit automatically floods a protected area with light whenever the ordinary current supply is interrupted. Portable, it can be carried from its regular station for rescue or other emergency work. Each lamp head is capable of illuminating more than 20,000 sq. ft. for approximately four hours. When normal current is resumed, the emergency lamps go out and a built-in charger restores power to the battery. The unit may be equipped with a built-in transformer to permit everyday use on regular current supply.

Capacitors (617)

Sprague Electric Co. has a line of Hypass capacitors, which it claims do not show resonance at frequencies as high as 50 megacycles and, in some cases, up to 300 megacycles. These capacitors are installed by connecting them in the circuit in the same manner as a low-pass filter. Their two terminals are connected in series with the circuit and the container is grounded in the usual manner.

F Luminaire (618)

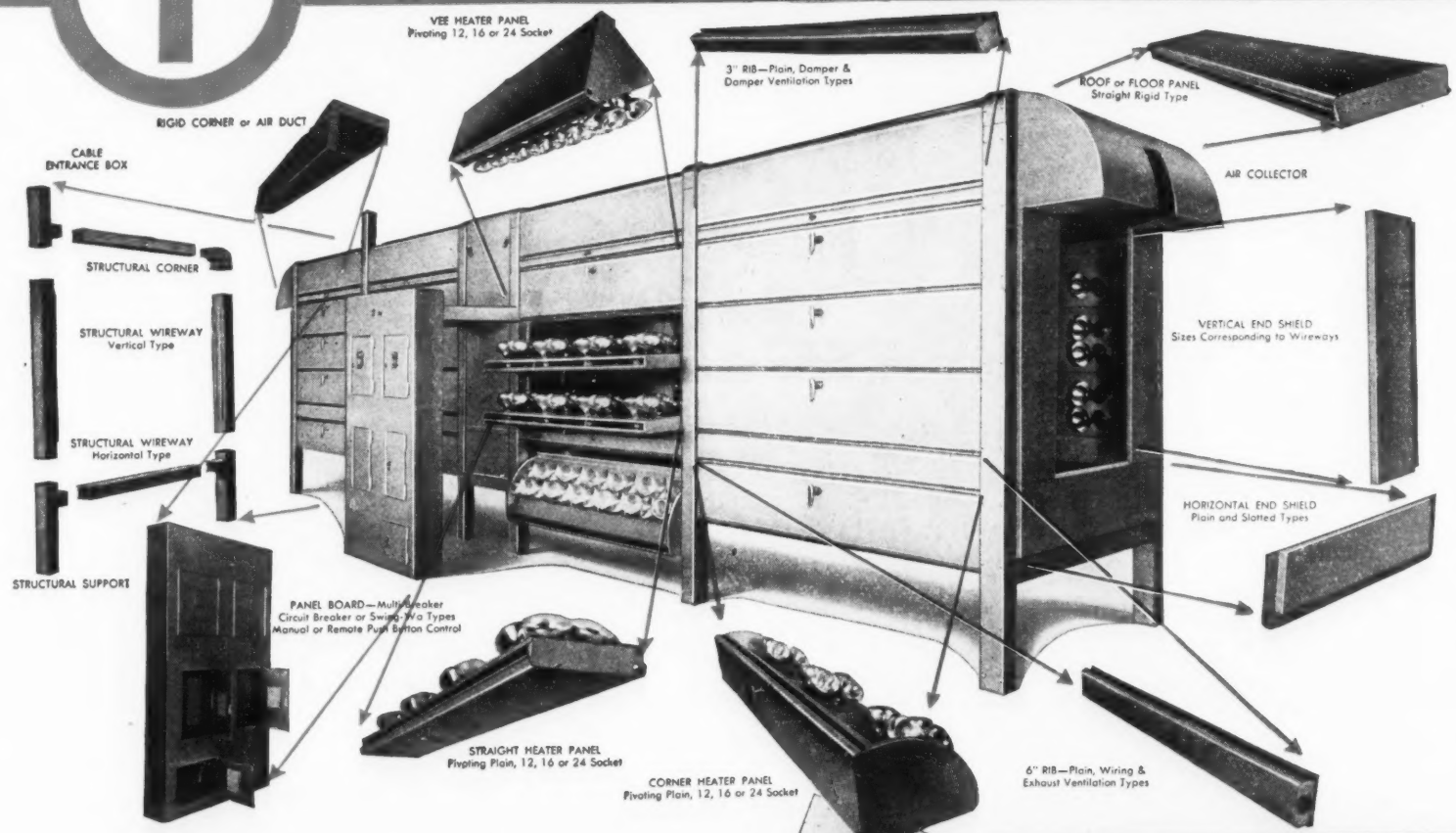
Pittsburgh Reflector Co. has announced the A-3440 fluorescent luminaire, a shielded type unit for four 40-watt lamps. Glass panels are said to be removed easily for maintenance. Mounting may be individual, continuous, direct to ceiling or suspension type.

Wire-Wound Resistors (619)

Shallcross has developed a line of hermetically sealed wire-wound resistors, which it states are resistant to moisture, fungus, vibration and rough handling. These units are available in two designs and in all resistance values from 1,000 ohms to 10 megohms.

TRUMBULL *standardizes* INFRARED *with* RAYMERSION

A *NEW* APPROACH TO THE EFFICIENT USE OF INFRARED . . . TODAY'S ACCEPTED STANDARD IN LOW TEMPERATURE INDUSTRIAL HEATING



Trumbull "Raymersion" Ovens assure full and uniform immersion in Infrared radiation and circulating convection heat. Controlled exhaust or recirculation overcomes stratification, utilizes all by-product losses from infrared and heated product. Work of any size, shape or mass may be handled at lowest costs and in minimum time.

THE TRUMBULL ELECTRIC MFG. CO.
Plainville, Conn.
Norwood, Ohio

Send for Bulletin No. 500

ANY SIZE ANY PRODUCTION
ANY HEAT CAPACITY
ANY HANDLING METHOD

OTHER FACTORIES
SAN FRANCISCO
SEATTLE
LOS ANGELES

Hal Morley

we named him nubun

HE'S HEADED FOR BIG THINGS
IN THE ELECTRICAL WORLD

Right on the threshold of electricity's most promising era comes NUBUN—a revolutionary development in wiring insulation.

Scientists of U.S. Rubber Company fathered this newcomer ... to provide better wire for countless new electrical installations ... in homes and factories, on farms, in communications services.

Research, starting with the rubber molecule itself, has produced a suitable new base rubber compound and a unique method of applying it through a process of dipping and drying, followed by vulcanization.

As a result, Nubun permits perfect centering of the wire, a much smaller over-all diameter and provides an insulating sheath that is flexible, moisture-resistant, tough.

Watch this lusty baby grow! Watch it help make a better world for you and for the success of the most peaceful days ahead.

nubun

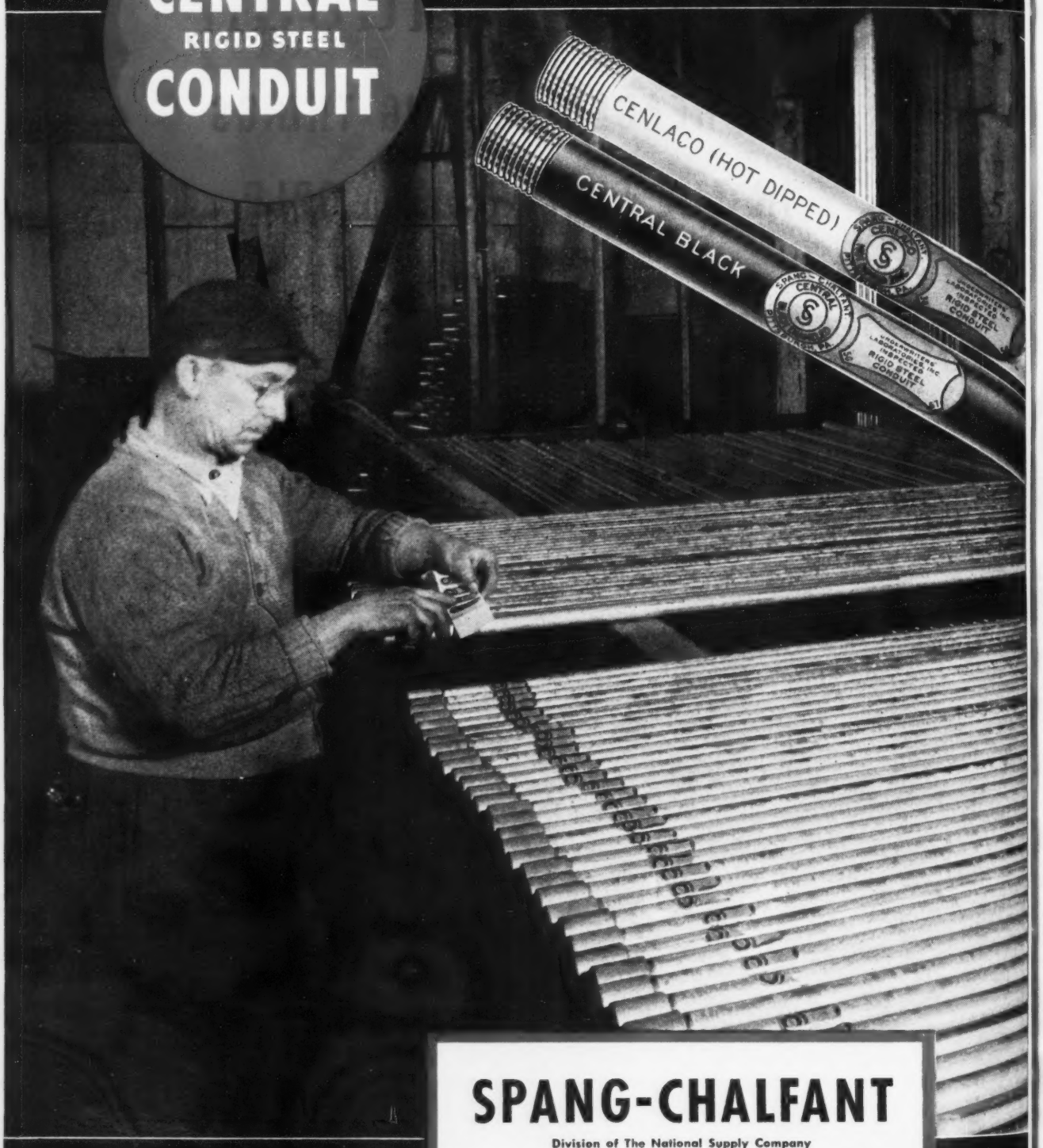
U. S. ELECTRICAL WIRES & CABLES

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue, Rockefeller Center, New York 20, N. Y. In Canada: Dominion Rubber Company, Ltd.

Final Assurance

that CENTRAL RIGID STEEL CONDUIT is the finest you can buy



"There's Tested Strength in Every Length"

SPANG-CHALFANT

Division of The National Supply Company

General Sales Office: Grant Building, Pittsburgh 30, Pa.

District Offices and Sales Representatives in Principal Cities

Improved System Stability

during short-circuit or overload with 5-cycle opening of the new Multiflow "De-ion" Grid in the reduced size Type GM oil breakers

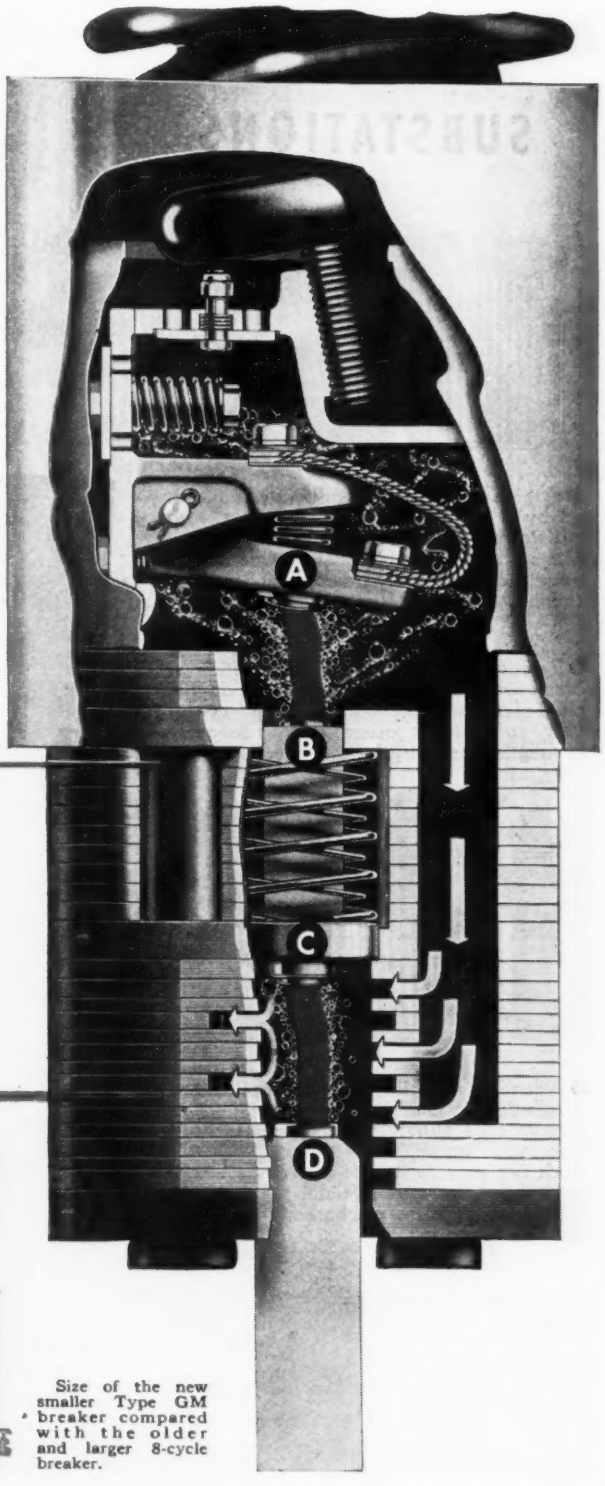
In Westinghouse Type GM oil circuit breakers, the Multiflow "De-ion" action makes possible a new high level performance in a standard line of breakers to again improve stability of power transmission systems.

The Multiflow Grid, another exclusive Westinghouse development, is simple in action. Two pairs of contacts open in quick succession, drawing two arcs in series. The first arc generates gas and produces oil pressure which forces oil through the second arc, and sweeps arc products out of the vents for speedy deionization. Opening is fast—5 cycles—extinction of arc almost instantaneous.

Smaller in size, but with same safety factor, these new breakers require less oil and less oil handling, and smaller foundations compared with older standard 8-cycle breakers. Reduced arc energy means longer oil life—less wear on contacts. Access to grids and contacts is easy—saving maintenance time.

Ratings range from 115 to 230 kv, with interrupting capacity up to 3,500,000 kva.

Get complete information from your Westinghouse office or write for B-3424, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60603



MULTIFLOW WORKS LIKE THIS...

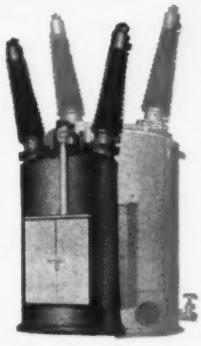
Contacts A and B part first, immediately followed by contacts C and D. Upper arc creates oil pressure, forcing oil through channel indicated by arrows down to compartment containing lower arc. This sweeps arc products out of the vents and produces an extremely high rate of deionization at current zero.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

TYPE GM

Circuit Breakers

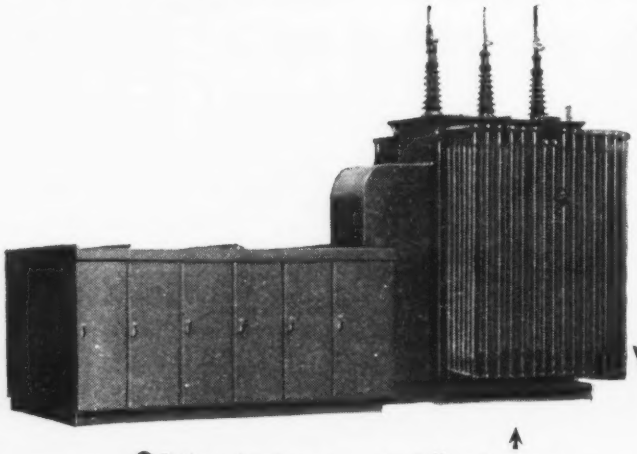


Size of the new smaller Type GM breaker compared with the older and larger 8-cycle breaker.

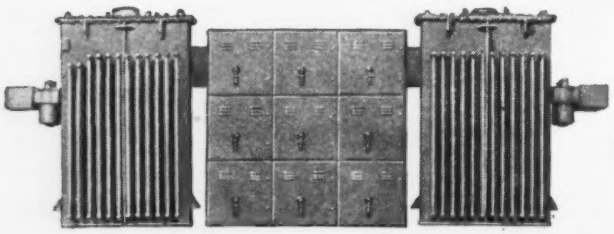
TO LIGHTEN YOUR

standard unit substations eliminate

UNIT SUBSTATIONS

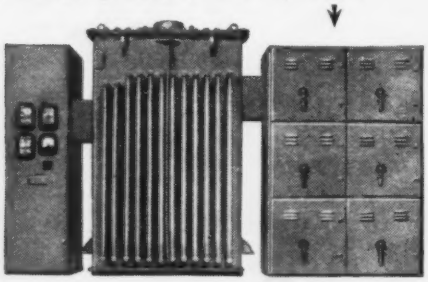


● Shifting loads are easy to follow because these completely enclosed, compact ***master unit substations*** are relatively easy to move. You avoid the confusion of lost or mislaid parts. Salvage value is 100 per cent.

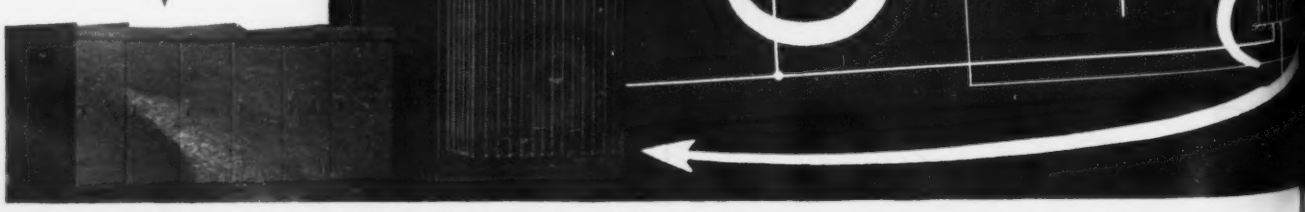


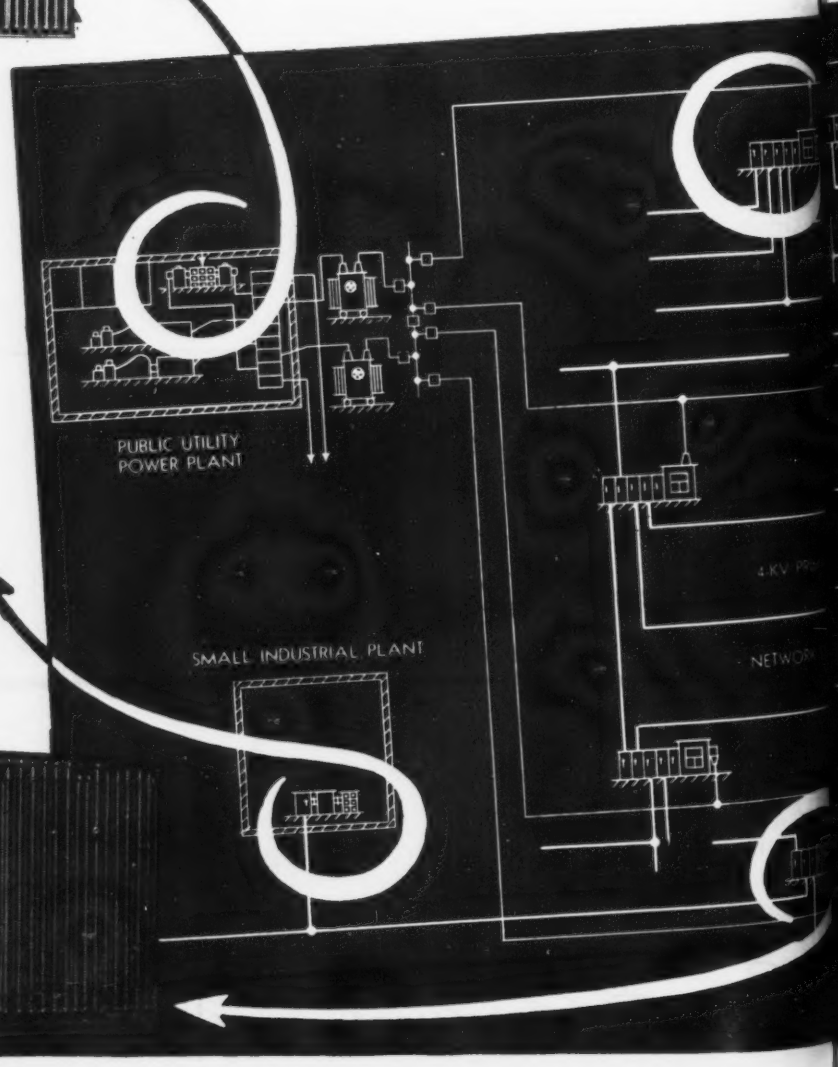
● A high degree of dependability is afforded by a ***double-ended load-center unit substation.*** Duplicate transforming sections with separate incoming lines provide double assurance of reliability for applications where continuity of service is of primary importance.

● It's easy to choose the best combination for circuit switching and protection in an industrial plant of any size. Standard G-E ***load-center unit substations*** assure really adequate interrupting capacity for every feeder.



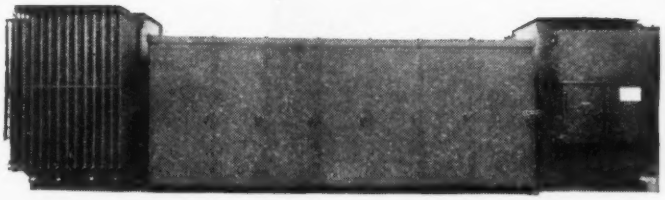
● Adequate reliability for most applications is afforded by the simple radial type of ***master unit substation.*** No matter what type you install, increasing loads are easy to handle with unit substations because duplicating units can be purchased as they are needed.





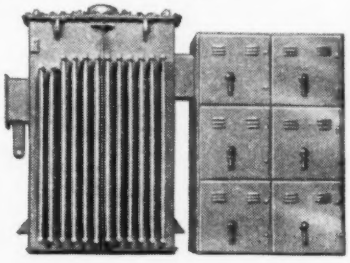
PLANNING LOAD

many worries about equipment details

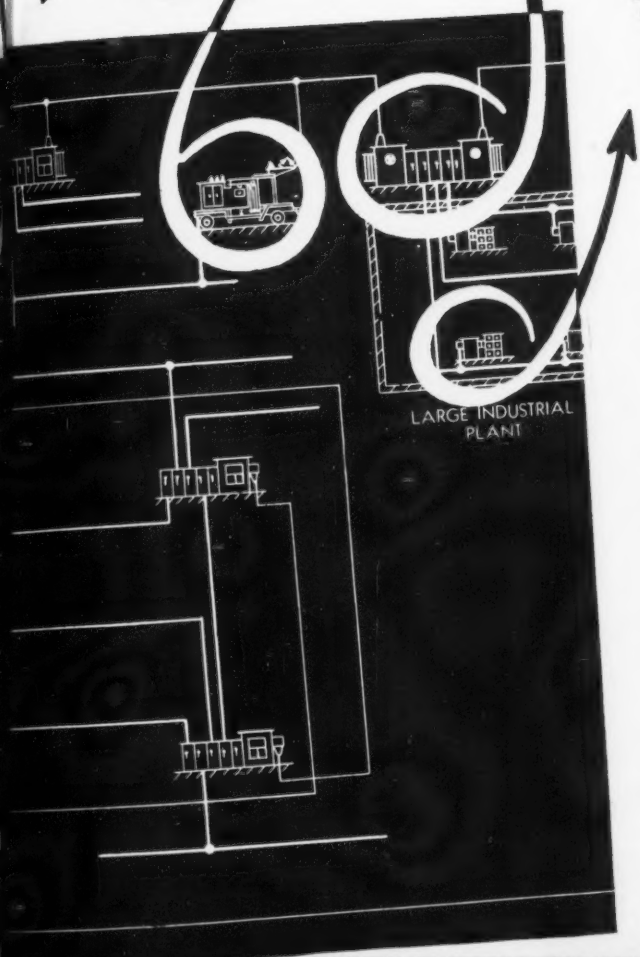


● G-E *master unit substations* are shipped directly to the installation site in completely assembled sections. Installation is always much faster and easier; the installed cost is predictable, and is usually much lower than that of a piecemeal substation.

● Prevention of long-period outages at any point on your system is easy when you have a *mobile unit substation* which has enough capacity to substitute, during an emergency, for any one of your substations.



● Whatever the application may be, there is a repetitively manufactured, standard G-E unit substation which usually can fill the requirements at a saving in cost, compared with the cost of the "special" you may have in mind.



MANY operating companies have found that, by deciding early to use factory-assembled unit substations, they would have more time to study the over-all aspects of their system. This enables them to plan the changes necessary to insure better over-all system operation.

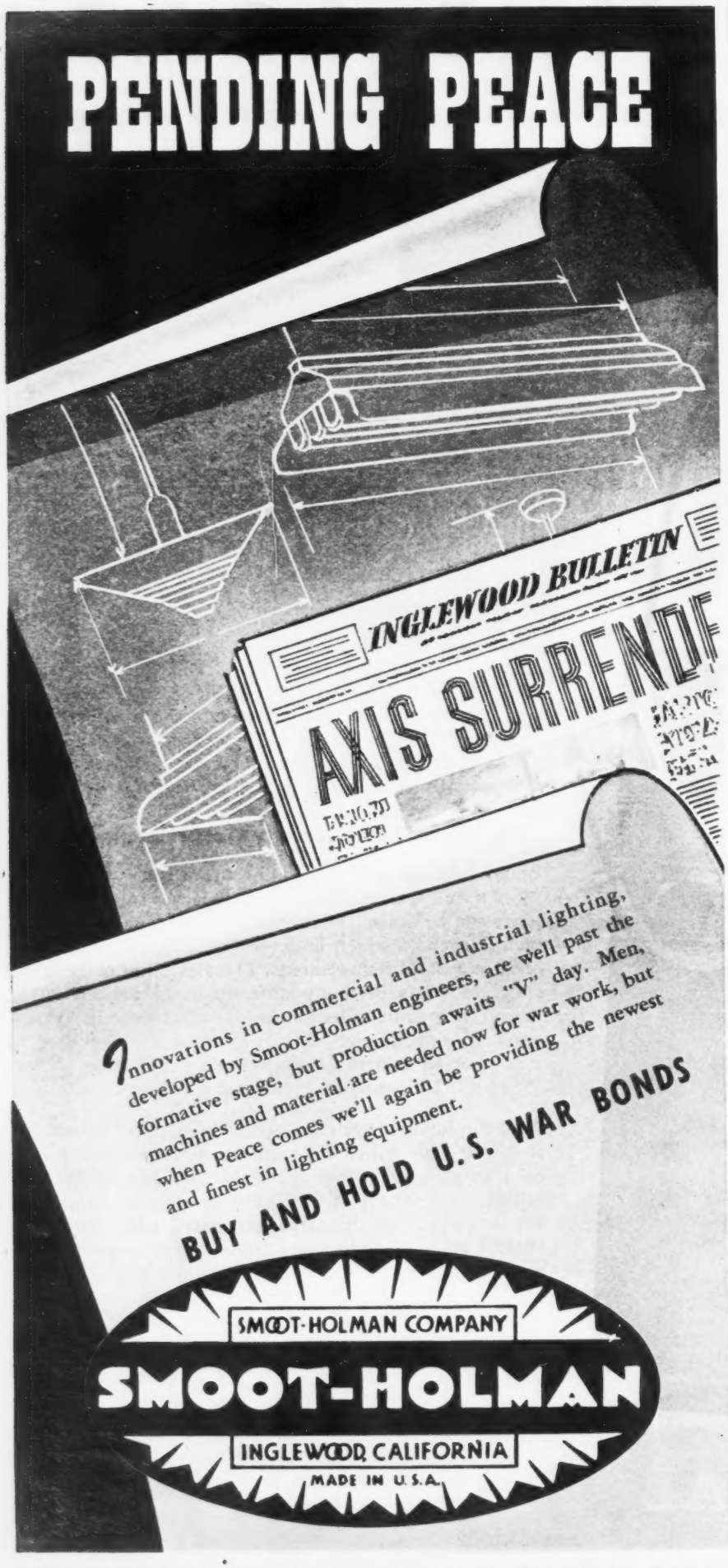
Why you don't have to worry about substation details

Standard G-E unit substations can meet almost any set of requirements. Like building blocks, unit-substation parts can be assembled in hundreds of standard arrangements, each of which is determined by the application and the system requirements. This flexibility of using the standard parts in many different combinations is the reason why unit substations can meet practically any application you may have; why you can feel free to plan over-all system improvements rather than devoting so much time to relatively unimportant details.

A well-planned system, one which has automatic, standard unit substations, means fewer customer outages, better voltage conditions, and a lower equipment-failure rate. The dispersal provided by a number of smaller units (see diagram), compared with one large, central substation, localizes trouble and prevents huge equipment losses as well as large-area outages.

Ask your G-E representative for Bulletin GEA-3800, or for a detailed presentation of our complete line in the light of your specific problem. *General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC



Innovations in commercial and industrial lighting, developed by Smoot-Holman engineers, are well past the formative stage, but production awaits "V" day. Men, machines and material are needed now for war work, but when Peace comes we'll again be providing the newest and finest in lighting equipment.

BUY AND HOLD U.S. WAR BONDS

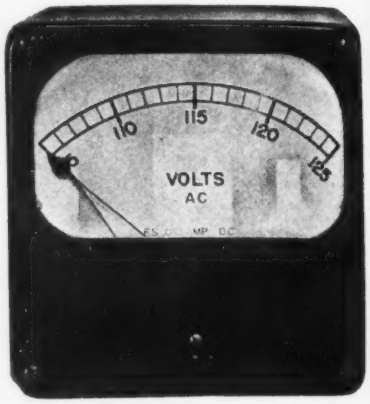
SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.

Offices in Principal Western Cities—Branch and Warehouse in San Francisco

Voltmeter (620)

Control Corp. is manufacturing the electronic magnified scale voltmeter shown below. Through error, this cut appeared in recent issue in connection with the description of another product.

Designed to meet the needs of power system operators, the unit has a small voltage band magnified to cover the full-scale range of a standard switchboard instrument.



The equipment consists of a standard voltmeter instrument and a small steel box containing the auxiliary electronic devices. The voltmeter is a standard small range d-c voltmeter and, according to the manufacturer, can be any one of a number of styles of different make, if it is desired to match other instruments on the switchboard. Recording voltmeters also can be used, it is stated.

The burden applied to a potential transformer by the voltmeter unit is approximately 7 va., 1.7 watts. Burden of the power supply unit is approximately 20 va., 17 watts. The voltmeter and auxiliary device are capable of maintaining accuracy within 0.2 of a volt, though it is pointed out that errors of other elements of the circuit will be magnified by the voltmeter. Accuracy under practical working conditions is well within the requirements, it is stated.

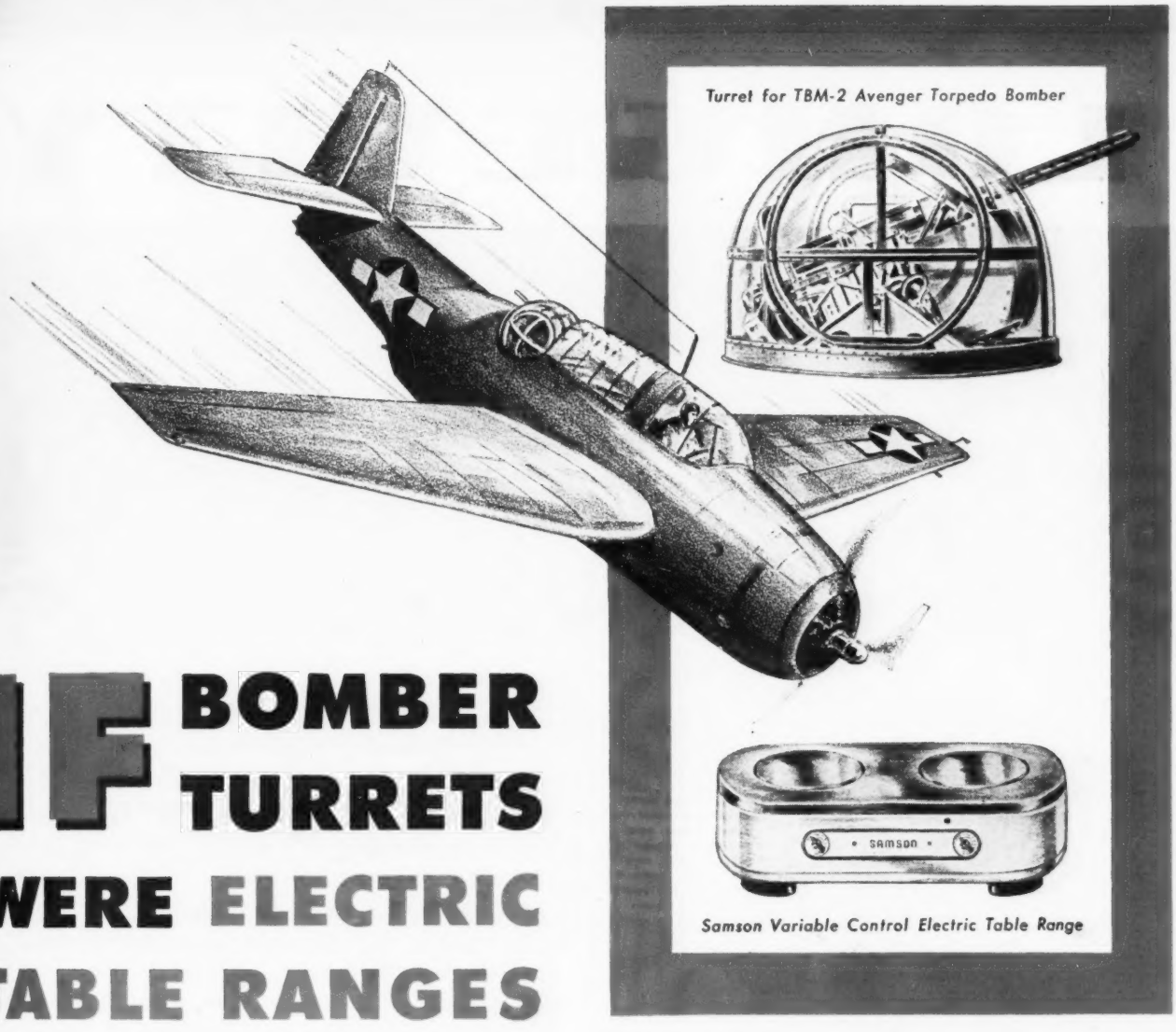
Mercury Clutch (621)

A clutch using mercury as the control medium has been developed by the Mercury Clutch Corp. to provide starting torque for power driven equipment. Models include a fractional horsepower type, 362-P, for domestic appliances and other applications utilizing small electric motors. The 450 series, type C clutch was designed for applications from 1 to 7½ hp., depending on speed and service factors, and is said to be suitable for use with electric motors or internal combustion engines.

In its simplest form, the clutch consists of a drum-like member attached to the power source and containing a small quantity of mercury confined in a narrow annular space. When this drum is revolved, the centrifugal force, varying as the square of the speed, urges the mercury outward, and the pressure created acts directly on the friction members, bringing them into contact with a drum attached to the load.

Fire Extinguisher (622)

American-LaFrance-Foamite Corp. has a new model fire extinguisher, which it states is fast acting and uses carbon dioxide as the extinguishing agent. It is made in three sizes, Models 15, 10 and 4, the numbers indicating pound capacity of the gas.



IF BOMBER TURRETS WERE ELECTRIC TABLE RANGES

Samson United Could Supply More Than 125,000 a Month

Of all the war items we are producing, the most elaborate, most complicated, and most exacting is the power Turret for the Avenger Torpedo Bomber. For three years we have been building it to the rigid specifications laid down by the United States Navy . . . and despite manpower and material shortages, we have met or surpassed monthly quotas of increasing volume.

If the facilities now devoted to this one war item alone were made available for peacetime manufacture, we *could,* if necessary, produce 125,000 Samson Electric Table Ranges every month!

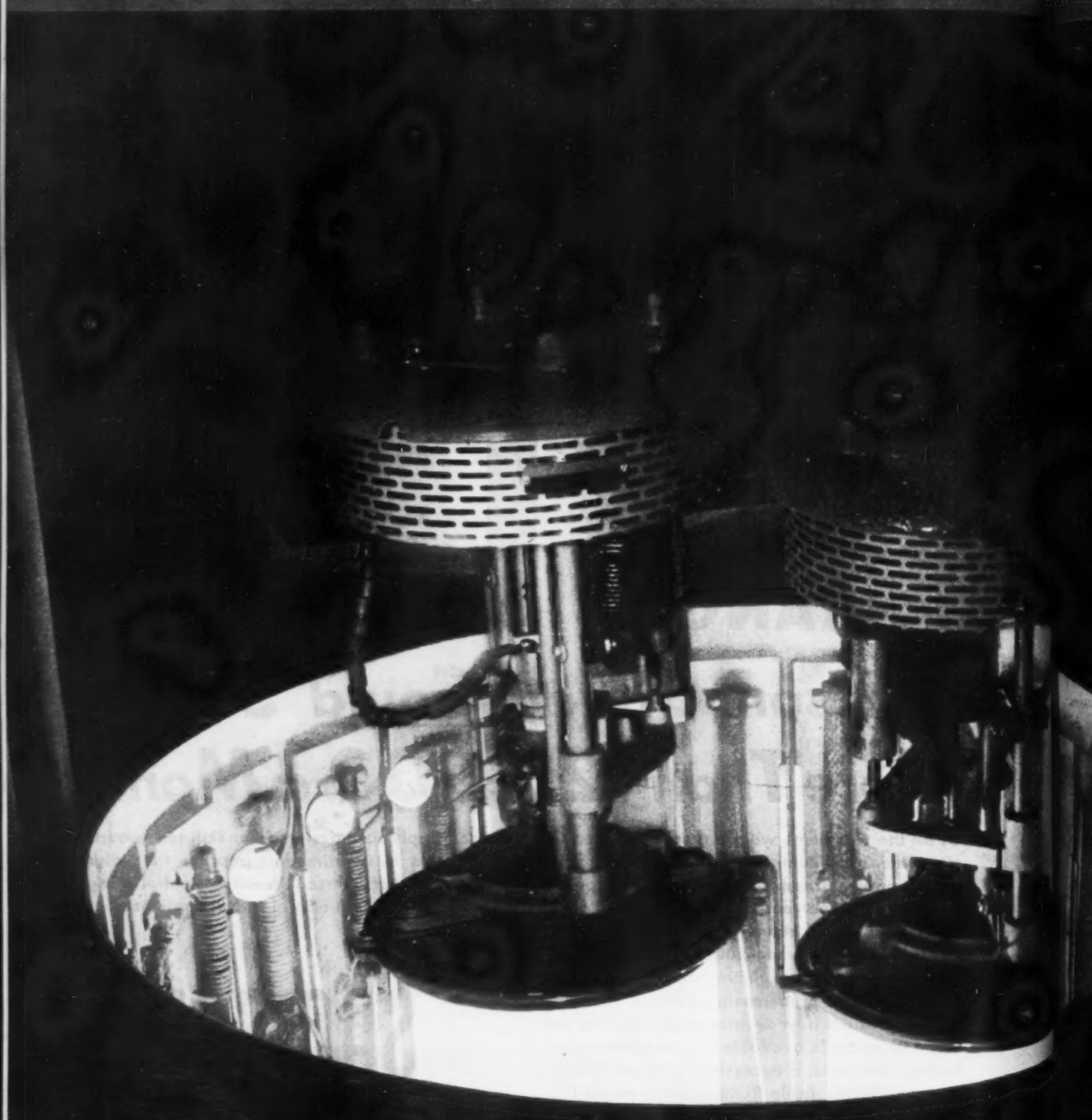
Unlike ordinary electric table ranges, the new Samson has *variable control* that provides *graduated* heat, yet automatically maintains the temperature selected. Thus it achieves the flexibility of a gas range.

We are eagerly awaiting the day when we can again apply our mass-precision skill and resources, amplified by wartime progress, to the volume production of Samson Variable Control Ranges and many other quality electrical appliances.

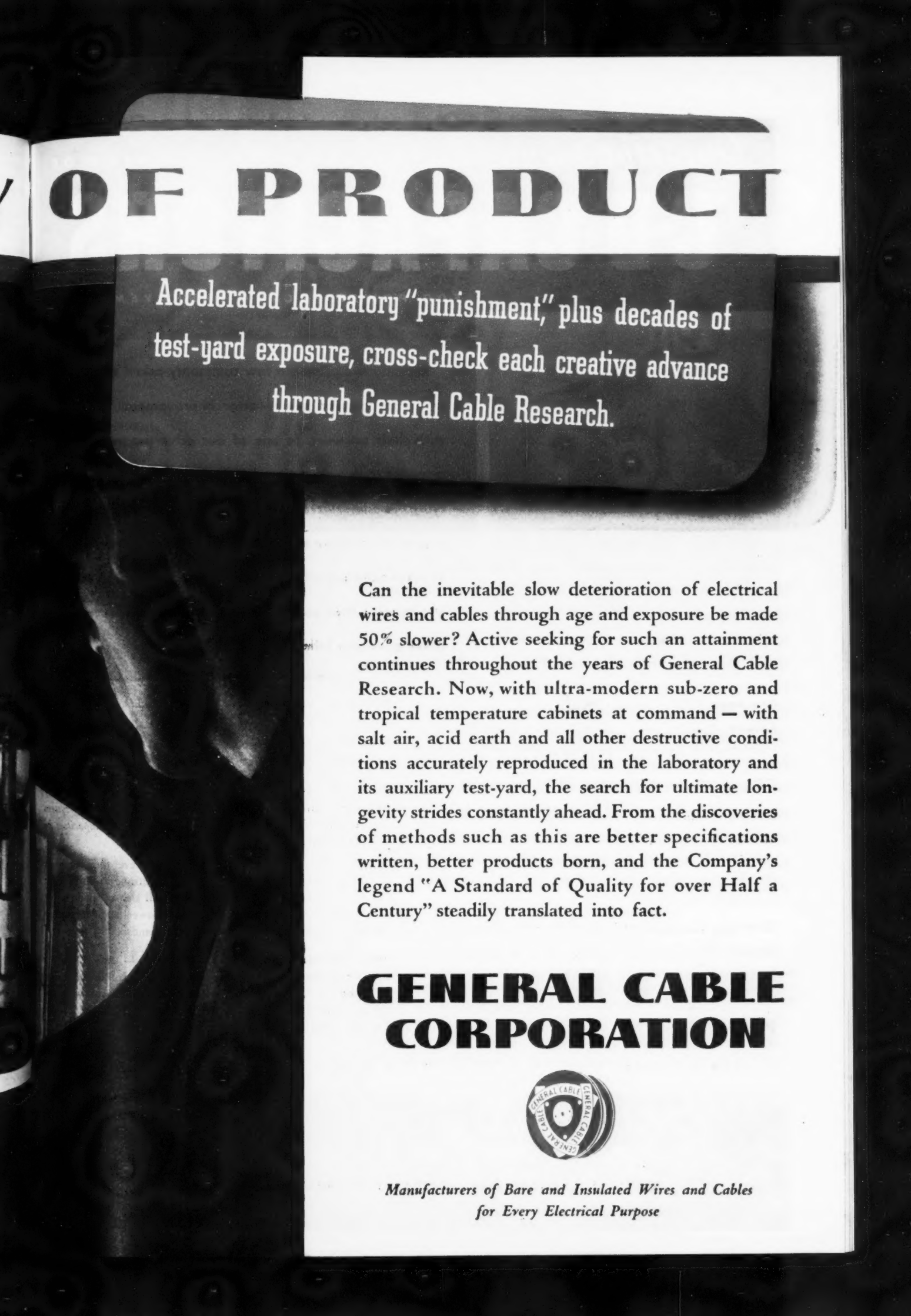
ELECTRICAL
SAMSON
APPLIANCES

SAMSON UNITED CORPORATION, ROCHESTER 10, N. Y.
Samson United of Canada, Limited, Toronto

LONGEVITY



Here, the moisture-permeability of a synthetic is tested in the "Weatherometer", a device which accurately measures the relative time-resistance of various insulating materials to the most damaging elements of weather:—ultra-violet rays, wind, moisture.


OF PRODUCT
Accelerated laboratory "punishment," plus decades of test-yard exposure, cross-check each creative advance through General Cable Research.

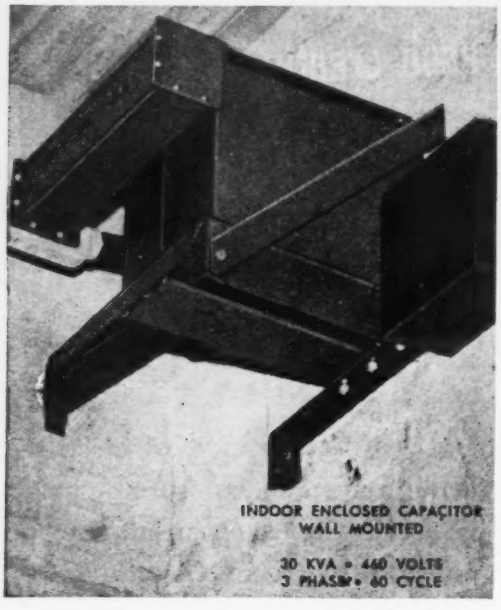
Can the inevitable slow deterioration of electrical wires and cables through age and exposure be made 50% slower? Active seeking for such an attainment continues throughout the years of General Cable Research. Now, with ultra-modern sub-zero and tropical temperature cabinets at command — with salt air, acid earth and all other destructive conditions accurately reproduced in the laboratory and its auxiliary test-yard, the search for ultimate longevity strides constantly ahead. From the discoveries of methods such as this are better specifications written, better products born, and the Company's legend "A Standard of Quality for over Half a Century" steadily translated into fact.

GENERAL CABLE CORPORATION

Manufacturers of Bare and Insulated Wires and Cables for Every Electrical Purpose

Questions and Answers ON THE SUBJECT OF C-D CAPACITORS

FOR POWER-FACTOR IMPROVEMENT



INDOOR ENCLOSED CAPACITOR
WALL MOUNTED
30 KVA • 460 VOLTS
3 PHASE • 60 CYCLE

Recently we printed a few commonly-asked questions on Capacitors for power-factor improvement, together with their answers, in one of our advertisements. The response to this advertisement has been extremely gratifying. Readers have written us, saying that this is the type of informative advertising they like to see. And many of them have submitted questions that have arisen in trying to solve their own power-factor problems. A few of these questions follow:

Question: *What is capacitor stress?*

Answer: Capacitor stress is the ability of capacitors to stand up under severe overload conditions. C-D capacitors have a high stress factor, and that is why they are a little heavier than other makes. C-D puts more into each capacitor.

Question: *Can capacitors be automatically controlled?*

Answer: Yes. One mid-western plant recently installed C-D capacitors hung from the cross beams supporting the roof. A magnetic contactor automatically throws them across the system when certain machines are put into operation.

Question: *Can capacitors be installed temporarily?*

Answer: Yes. Recently we supplied one of the largest capacitor installations in the country. The capacitors were mounted on wooden cradles in an open lot in the back of the plant. After the war, these capacitors will be moved to other focal points of low power-factor on the system.

Question: *What government restrictions control the installation of capacitors?*

Answer: Since they involve some critical materials, they must be purchased on priorities.

Question: *Capacitors are necessary now — when the demand for power is greater than that which our generator and feeder system can supply — but what about after the war? Will capacitors be another white elephant on our hands?*

Answer: No. Capacitor installations will never become white elephant investments. Not only will they continue to improve the efficiency of the entire system, but they will also continue to pay dividends by maintaining uniformly high power-factor throughout the year, regardless of seasonal power demands.

When you specify capacitors, remember — only C-D's are experience-built by thirty-five years of specialized capacitor engineering. Our engineers will be glad to consult with you on your specific requirements. No obligation, of course. Cornell Dubilier Electric Corporation, South Plainfield, N. J.

FOR POWER-FACTOR IMPROVEMENT • CARRIER CURRENT COUPLING • SURGE PROTECTION

Cornell-Dubilier Capacitors

WORLD'S LARGEST MANUFACTURERS OF CAPACITORS 1910 1945

Type EGP — a whole series of *Explosion-Proof* CONDULETS

designed especially for panelboard mounting — exclusive with CROUSE-HINDS

Type EGP Combination Push Button Station and Pilot Light Condulet. Installed on Panelboard. Broken-away view.

Switches and pilot lights — single or in combinations.

Factory sealed — installation seals unnecessary.

Flame-tight threaded covers.

Adjustable for all panels — ⅛" to 1-¼" thick.

Easy to install in quickly drilled circular panel openings, all of the same size. Switches may be rotated up to 10 degrees for alignment.

Attractive appearance — dead black instrument finish on exposed parts.

Listed in Condulet Catalog No. 2500, Section 85, Page 26-AA1

Crouse-Hinds also manufactures a complete line of explosion-proof housings for instruments, gauges and meters for panelboard mounting.

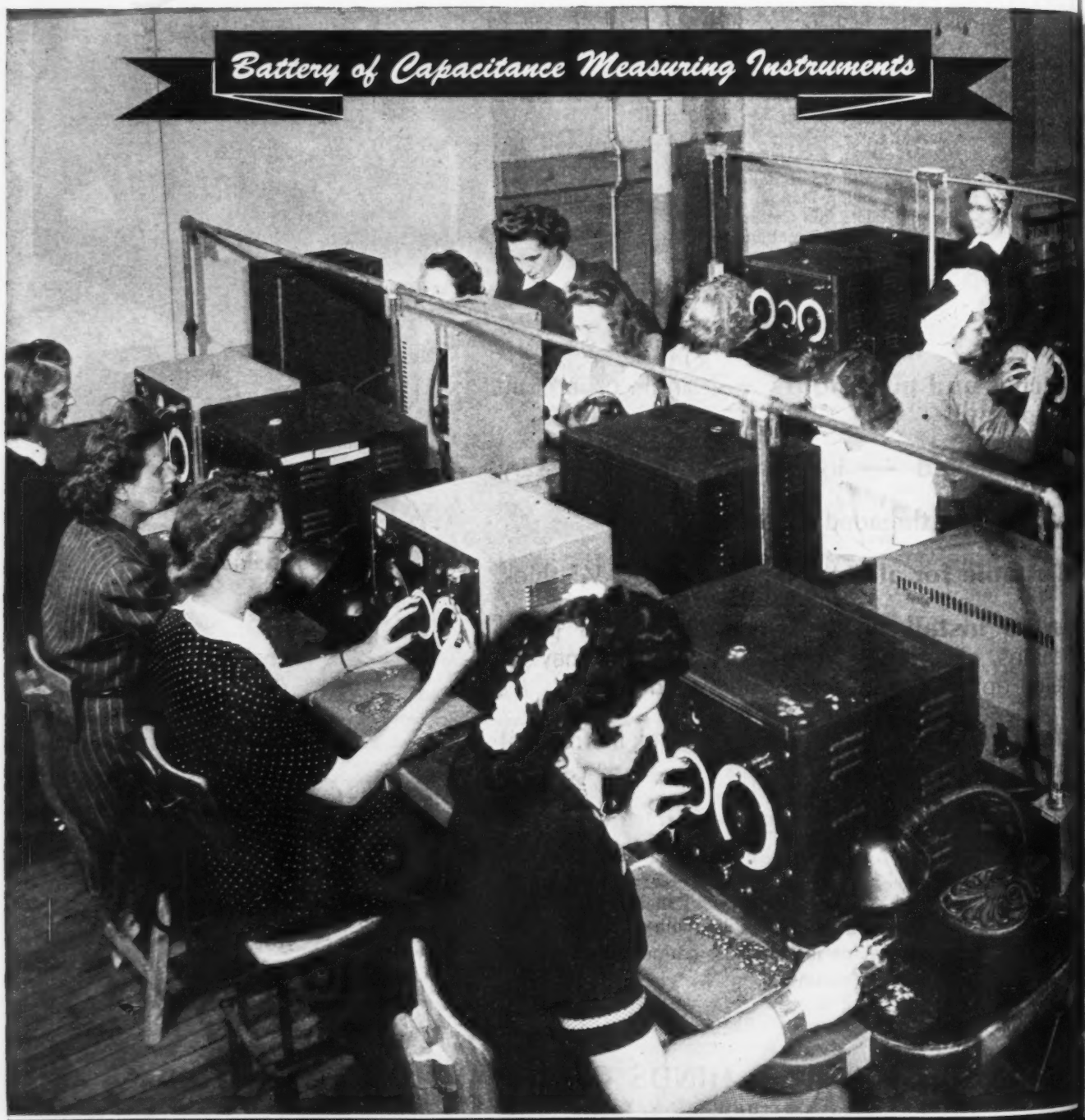
A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY
Syracuse 1, N. Y., U.S.A.

Offices: Birmingham — Boston — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City Los Angeles — Milwaukee — Minneapolis — New York — Philadelphia — Pittsburgh — San Francisco — Seattle — St. Louis — Washington
Resident Product Engineers: Albany — Atlanta — Charlotte — New Orleans
CROUSE-HINDS COMPANY OF CANADA, LTD., Main Office and Plant: TORONTO, ONT.

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

HOW EXCELLENCE IS BUILT INTO . . .



SANGAMO ELECTRIC

ESTABLISHED 1898 • • • MICA CAPACITORS • • •

SANGAMO
MICA CAPACITORS

● *Here, capacitance of silvered mica lamination used in the manufacture of Sangamo Mica Capacitors is measured on Sangamo built equipment. Extremely accurate calibration of each individual lamination insures a resultant capacitance within prescribed limits.*

Checking Capacitance

Excellence as reflected in the quality of mica capacitors is the result of advanced manufacturing techniques and constant vigilance, coupled with scientific measurements, frequent checks and inspections. Such advanced methods and techniques are incorporated as an integral part in the manufacture of Sangamo Mica Capacitors.

Advanced manufacturing techniques necessarily include precision equipment operated by trained skillful operators. While a great variety of accurate measuring equipment is commercially available, for the most part Sangamo has designed, developed, and built much of the test equipment used in testing capacitors in various stages of manufacture.

In the step checking, that is, the frequent checking of units at various stages of their manufacture, the equipment used is of particular importance. In many instances variations of only a few parts in a million mean the difference between a quality product and one that would not function satisfactorily. It is obvious that such testing equipment must be interchangeable, and identical readings must be obtained on each of the many pieces of apparatus which may be used in the processing of a single capacitor unit. It is also necessary that this equipment be designed for production operation and be capable of long, hard use without deviation in accuracy. Further, it is essential that such checks be made under conditions of controlled temperature and humidity. For this reason, Sangamo Capacitors are manufactured in completely air-conditioned departments. This eliminates undesirable moisture from the operators' fingers and prevents, in a large measure, the absorption of moisture from the atmosphere. Thus, excellence in quality as incorporated in Sangamo Capacitors is the result of careful planning and accurately controlled production methods.

COMPANY SPRINGFIELD ILLINOIS

• • WATT HOUR METERS • • • TIME SWITCHES • • •

Chromy says:

"The Fit makes a Hit!"

For *all* Electric Ranges

"It's always a perfect fit" when you replace with CHROMALOX *Superspeed* and *Heatflo* Units. The CHROMALOX Snap-on Adaptor Ring does it...for CHROMALOX Adaptor Rings—installed in a jiffy—stay snug and tight.

More profit too with CHROMALOX units. A small inventory of *Superspeeds* and *Heatflos* plus inexpensive Snap-on Adaptor Rings, service all makes of Electric ranges. Less manpower, time and inventory means more profit to you per call.

Write for Bulletin CF-145 showing CHROMALOX *Superspeed* and *Heatflo* Range Units which are available for immediate replacement.

These famous CHROMALOX *Super-speed* and *Heatflo* units are the result of twenty-five years continuous research and engineering in the field of electric heat under rigidly maintained standards of excellence.

Edwin L. Wiegand Co.

7540 Thomas Blvd. Pittsburgh 8, Pa.

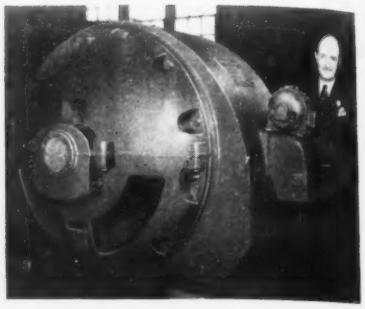
Montgomery Bros., 420 S. San Pedro St., Los Angeles, Calif.; 2333 N.W. Westover St., Portland 10, Oregon; 61 Fremont St., San Francisco 5, Calif.; 911 Western Ave., Seattle 4, Wash.
The Peterson Co., 1921 Bleke St., Denver 2, Colorado

on new ranges and for replacements

CHROMALOX

means *Electric Cooking at its Best!* RC-5

Motor (623)



General Electric has added a 2,000-hp. unit to its line of tri-clad motors. This motor is a squirrel-cage induction type and was designed for use in large central power stations and large industrial applications. It is in the 6,360-frame series (five steps larger in diameter than the largest standardized frame); operates at 1,800 r.p.m.; is rated 2,000 hp., 2,300 volts, three phase, 60 cycles.

Photo Dryer (624)

Peck and Harvey is making an improved B-8 photo dryer, which operates with additional electrical heating elements for even distribution. Thermostatic control is available at extra cost, and variable-speed drive motors and controllers permit instantaneous speed changes over a range of 6 in. to 3½ ft. per minute, it is stated. Two sizes are manufactured for operation on 110 volts a-c or d-c. A 220-volt machine is available also.

Receptacle (625)

Cannon Electrical Development Co. is making a new type three-contact battery receptacle conforming to Army-Navy specification AN2552. Four combinations are available: AN2552-1, complete fitting with shield and three pin contacts; AN2552-2, shield less small pin contact; AN2552-A1, panel without shield but having small pin contact; AN2552-A2, panel without small pin contact.

F Starters (626)

Sylvania has added two manual reset starters for 100-watt fluorescent lamps. One of the units, COP-6, is a two-contact starter and the other, COP-64, has four contacts for use in fixtures designed for another type of starting circuit. They are designed to cut out deactivated lamps and a push button manual reset it provided. The company makes a similar starter for 40-watt lamps.

Paper-Dielectric Capacitors (627)

G-E has a new line of hermetically sealed, fixed paper-dielectric capacitors with glass terminal seals, case styles CP-60, -62 and -64, characteristics E and F. These units are said to meet the requirements of the proposed joint Army-Navy specifications JAN-C-25 and are for use in combat communication equipment where severe operating conditions may be encountered.

Tube Sockets (628)

Electronic Mechanics Inc. has a new series of high-frequency Mykroy tube sockets. Included are standard 3-, 5-, 6- and 7-prong type; octal and loctal sockets for multiprong tubes; 5- and 7-prong acorn sockets; 4-prong high-voltage rectifier sockets and heavy-duty 50-watt type.

available now...

the NEW

Westinghouse 100-Ampere Type EA Fuse Cutout

ONLY WESTINGHOUSE EA CUTOUTS OFFER *ALL* THESE ADVANTAGES:

PORCELAIN-ENCLOSED FOR SAFETY. Prestite porcelain provides dimensional fidelity, and assures interchangeability of doors: dropout and non-dropout fuse doors, disconnect blade doors.

COMPLETE HOOKSTICK OPERATION for extra safety. Door is easily inserted or removed, opened or closed with hookstick . . . no danger of contact with live parts.

FEWER JOINTS IN CURRENT PATH result in cooler operation, less maintenance and longer life. Two to seven less joints in current path than in other cutouts.

NON-SWELLING FUSE TUBE cuts maintenance, increases life. Fiber lining (to help extinguish arc) is enclosed in moisture-proof Micarta.

FULL 180° DROPOUT removes fuse holder from both contacts after interruption. Blown fuses are readily spotted on the line.

Latest addition to the line of EA Fuse Cutouts is this 100-ampere unit. This husky job contains all the exclusive advantages of other EA types plus the strength demanded for extra-heavy duty.

Extra large hookeye on door permits quick, free opening with gloved hand. Joints in the current path have been reduced to a minimum, eliminating the primary cause of overheating. These features typify Westinghouse attention to detail. Decades of cutout experience under all conceivable conditions and constant improvements by Westinghouse engineers have made the Type EA Cutout unsurpassed for reliability, long life and easy re-fusing.

Ratings of EA Cutouts are 50 and 100 amperes at 5 and 7.5 kv. Phone your Westinghouse office for further information, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60583

Westinghouse TYPE EA FUSE CUTOUT

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Facing the Dawn of Peace

The cessation of hostilities in Europe gave all of us a warm feeling of joy and thanksgiving, and filled our hearts with a prayer for the early end of the Japanese struggle. Being realists, however, we recognize that, just as the dawn of each new day is accentuated by the shadows which it creates, the dawn of peace casts long shadows of new problems which must be met and solved. While these are individual problems faced by individual firms, the best solutions can only be reached through cooperative thinking and a liberal interchange of ideas. Such problems include:

Getting the returning veterans back to work.

Adjustment to reconversion to civilian production.

Adjustment to release from governmental restrictions and regulations.

Development of sales programs and load-building programs.

Facing the inevitable intense competition between industries.

These, and many others, point to the increasing need for Association contacts and activities. There is no substitute for the facilities which an association offers its members for contact with each other for the exchange of ideas. Formal papers are merely the skeleton around which meetings are built—the real value of a conference lies in the informal discussions, which stimulate the individual alertness and act as a tonic to the mental activities of the delegates.

War creates a lethargy. In wartime individual planning must, of necessity, cease. All activities are consecrated to the single purpose of winning the war, and the individual is subordinated to an over-all plan toward that objective. Peace will restore individual initiative and competition, but it will also necessitate a great pooling of intelligence and planning within each industry. Prepare now to meet this challenge.

PACIFIC COAST ELECTRICAL ASSOCIATION, INC.

601 West Fifth Street
Los Angeles, 13

447 Sutter Street
San Francisco, 8

Free Discharge Valves

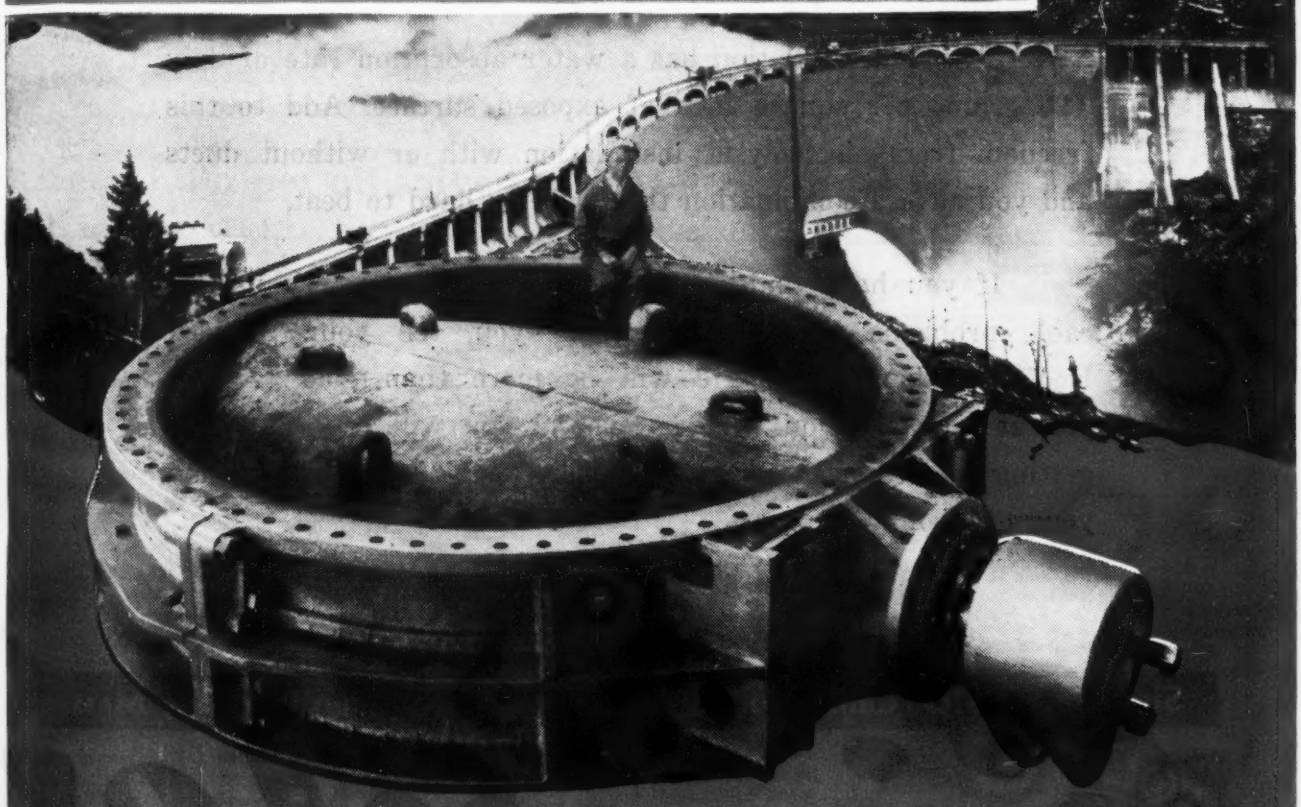
Many of the largest valves are built by the Pelton Water Wheel Company.

· Valves like the big fellow shown below are used in hydro-electric power projects, for flood control, and at city water-storage dams to release water downstream.

Such valves demonstrate the engineering achievements and manufacturing facilities of the Pelton Water Wheel Company.

This valve is operated hydraulically and is also designed for emergency closure against a full head of water.

Another type of gigantic valve built by Pelton is the Larner-Johnson Valve which has a water-balanced plunger and is thereby easy to operate either by hand or remote electrical control. Being streamlined, it gives a smooth flow of water at any given opening.



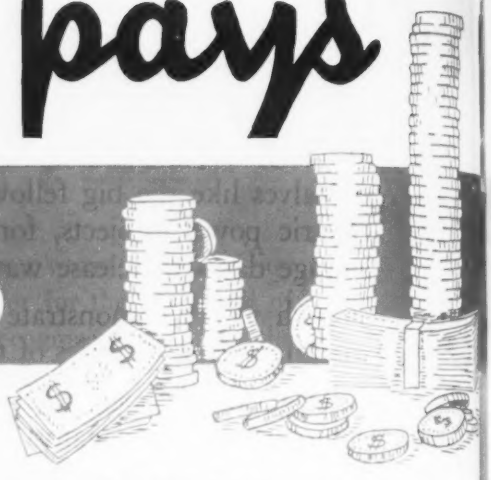
BLW THE BALDWIN GROUP

The PELTON WATER WHEEL Company

A Subsidiary of the Baldwin Locomotive Works

2929 NINETEENTH STREET · SAN FRANCISCO 10, CALIF.

Research pays Dividends



When the war came along and we were deprived of our supply of deproteinized rubber we all thought, "Well, that's the end of ANHYDREX until after the war." However, our very capable technical staff came through with an ANHYDREX Buna rubber insulation that we are proud to offer.

This new insulation has a water absorption rate of only .020 grams per square inch of exposed surface. Add to this freedom from electrolysis, installation with or without ducts and you have a combination that's pretty hard to beat.

If you have underground power, control or submarine cable problems that are bothering you, tell your Simplex Engineer about them. He will be more than glad to help you at no obligation whatsoever and you will be assured of getting the latest and most modern engineering advice on your problem.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex

WIRES and CABLES

STANDARD ENGINEERS NOTEBOOK

VOL. 2-E No. 4

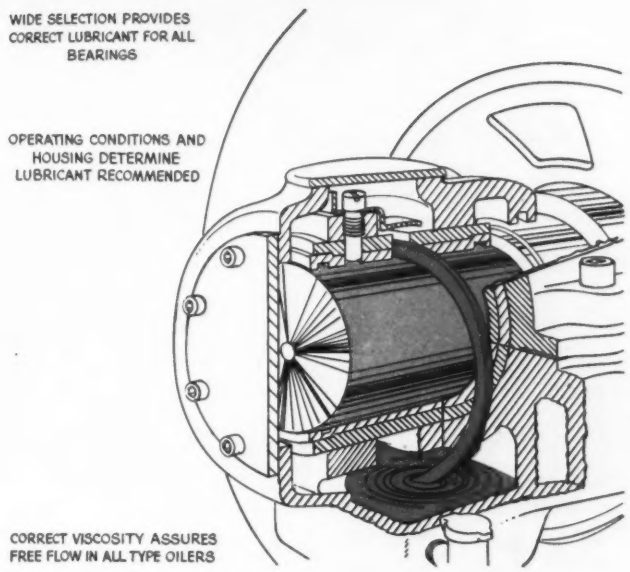
Calol oils maintain electric motor efficiency

Meeting all conditions encountered in the various types of bearings used in electric motors, Calol Oils reduce friction to a maximum degree, carry away heat and minimize the formation of deposits.

For electric motors equipped with ball- and roller-bearings Calol Engine Oil 8 or 10 is recommended when speeds are high, operating conditions normal and housings oil-tight. Calol Turbine Oil 15 or 19 is used when speeds are low or temperatures high and there is a heavy end-thrust; Calol Diesel Engine Oil 65 or Calol Deturbo Oil 60 when bearings operate under extreme pressures and temperatures.

Three recommendations are made for motors equipped with ring-oilers. Calol Engine Oil 8 for low temperature conditions, Calol Engine Oil 10 for normal temperatures and Calol Turbine Oil 15 for high temperatures.

Where wick-oilers are used or oil is applied to waste, the recommendations for ring-oilers apply.

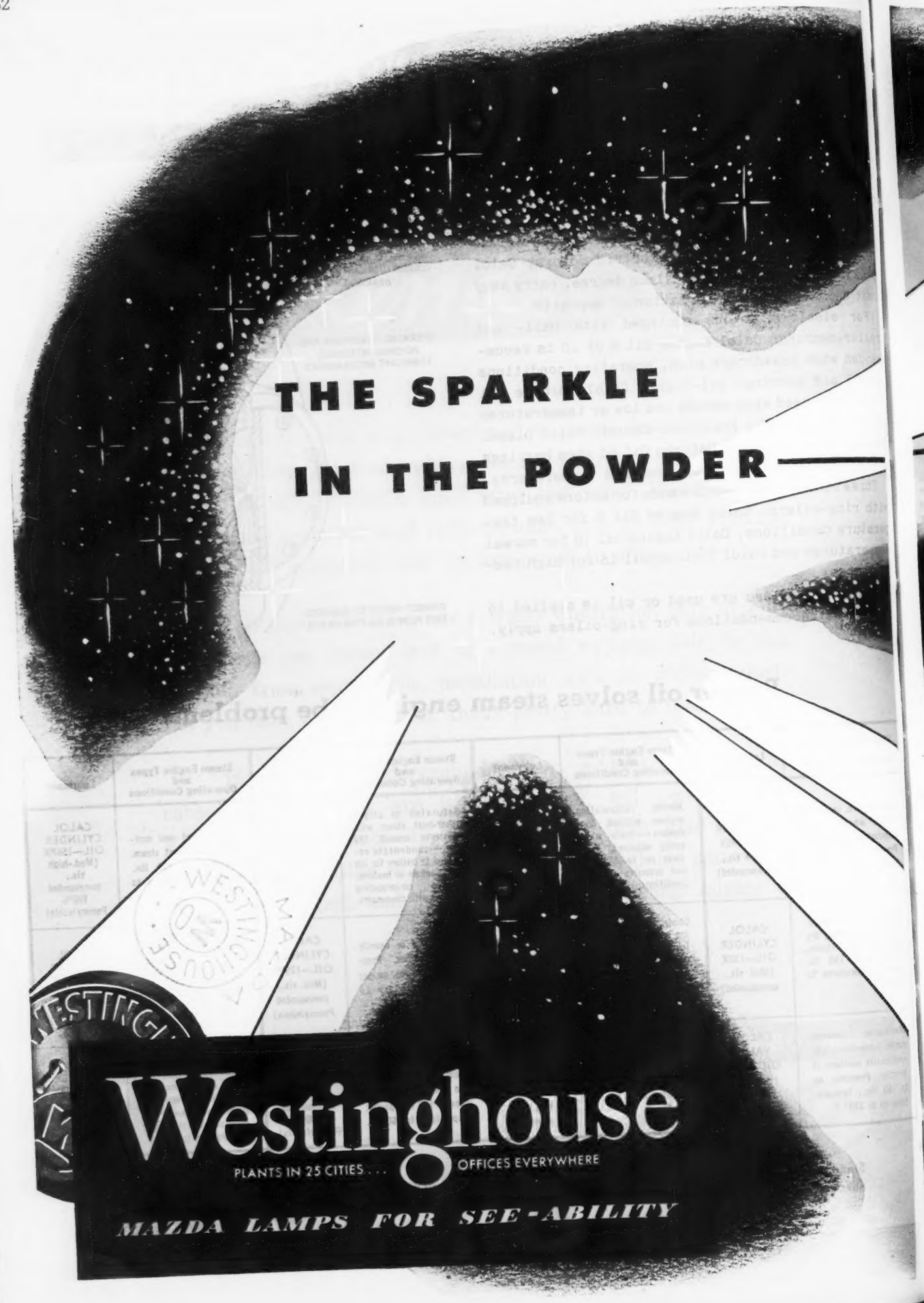

WIDE SELECTION PROVIDES CORRECT LUBRICANT FOR ALL BEARINGS
OPERATING CONDITIONS AND HOUSING DETERMINE LUBRICANT RECOMMENDED
CORRECT VISCOSITY ASSURES FREE FLOW IN ALL TYPE OILERS

Proper oil solves steam engine lube problems

Steam Engine Types and Operating Conditions	Lubricant	Steam Engine Types and Operating Conditions	Lubricant	Steam Engine Types and Operating Conditions	Lubricant	Steam Engine Types and Operating Conditions	Lubricant
Low pressure, saturated steam where rapid atomization required. Pressures up to 100 lb. gauge.	CALOL CYLINDER OIL—95X (Low vis., compounded)	Marine reciprocating engines without condensers — fresh water easily obtained. Pressures up to 150 lbs. and excessive moisture conditions.	CALOL VALVE OIL—125FX (Med. vis., heavily compounded, filtered)	Saturated or slight super-heat steam with pressures around 150 lbs.—condensate returned to boilers for ice manufacture or heating. Marine reciprocating engines with condensers.	CALOL CYLINDER OIL—160 (Med.-high vis., straight mineral)	Normal wet and moderate super-heat steam. Pressures to 225 lbs. gauge; temperatures to 550° F.	CALOL CYLINDER OIL—155PX (Med.-high vis., compounded 100% Pennsylvania)
Stationaries, donkeys, pumps, units using dry and saturated steam. Pressures to 150 lb. gauge; temperatures to 370° F.	CALOL CYLINDER OIL—130X (Med. vis., compounded)	Condensing-steam, heating and distilled-water-ice plants, etc., where rapid separation from water necessary. Pressures to 160 lb. gauge; temperatures to 375° F.	CALOL CYLINDER OIL—135FX (Med., vis., lightly compounded, filtered)	High-speed or heavily loaded engines. Pressures to 150 lbs. gauge; temperatures up to 400° F.	CALOL CYLINDER OIL—125PX (Med. vis., compounded Pennsylvania)	Pressures to 160 lbs. gauge; temperatures to 450° F. For same conditions as Calol Cylinder Oil — 135FX when non-compounded oil desired. Marine reciprocating engines with condensers.	CALOL CYLINDER OIL—150P (Med. vis., uncompounded Pennsylvania)
Stationaries, donkeys, pumps, locomotives, etc. —excessive moisture at throttle. Pressures up to 150 lbs.; temperatures up to 370° F.	CALOL VALVE OIL—130X (Med. vis., heavily compounded)	Steam cylinders. Pressures from 140 lb. gauge to 200 lb. gauge; temperatures up to 450° F.	CALOL CYLINDER OIL—155X (Med.-heavy vis., compounded)	Dry and saturated steam and slight moisture conditions. Pressures to 160 lbs. gauge; temperatures to 450° F.	CALOL CYLINDER OIL—140PX (Med. vis., compounded 100% Pennsylvania)	Corliss, poppett and piston-valve type engines and locomotives. Dry, saturated and high super-heat steam. Pressures over 160 lb. gauge; temperatures to 700° F.	CALOL CYLINDER OIL—190PX (High vis., compounded 100% Pennsylvania)

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

STANDARD OF CALIFORNIA


THE SPARKLE
IN THE POWDER
WESTINGHOUSE
Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE
MAZDA LAMPS FOR SEE-ABILITY

PUTS SEE-ABILITY IN THE LAMPS

The powdered phosphor in Westinghouse Fluorescent Lamps is one of the secrets why they last so long—stay so bright—and are so efficient. The soft, cool light that makes Westinghouse Fluorescent Lamps famous is due in no small measure to the care and attention paid to the coating of the glass tube.

Starting with the finest materials available, the powder is ground to the exact grain-size, carefully blended, acid-washed, fired and then impurities are removed so that not one part in a million remains to affect the light output. The result is a coating that gives you the bright sparkle and long life you naturally look for in a fluorescent lamp.

Westinghouse engineering and manufacturing leadership has brought you this. And with it, the confidence that the name "Westinghouse" is not only a "buy-word"—it is a "sell-word" wherever quality is known and appreciated.

Westinghouse Electric Corporation, Lamp Division, Bloomfield, New Jersey.

• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES •

• ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • BUILDING WIRE •

• PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •

CRESFLEX

NON-METALLIC SHEATHED CABLE

FACTORY ASSEMBLED AND TESTED

EASILY INSTALLED AT LOWEST COST

TOUGH PAPER ARMOR

WEATHERPROOF FLAME-RETARDING JACKET

PARTICULARLY WELL SUITED FOR WIRING FARM BUILDINGS AND LOW COST HOUSING

CRESCENT

WIRE and CABLE

NEMA

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, N. J.

• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

Decade Units (629)

A line of flexible circuit components having ten units has been developed by Harvey-Wells Electronics Inc. and is claimed to give almost any desired value or combination of values covering capacitance, inductance, resistance, transformer ratios, etc. According to the manufacturer, the components may be used to simulate operating conditions for testing equipment in laboratories, power companies, repair shops and factories.

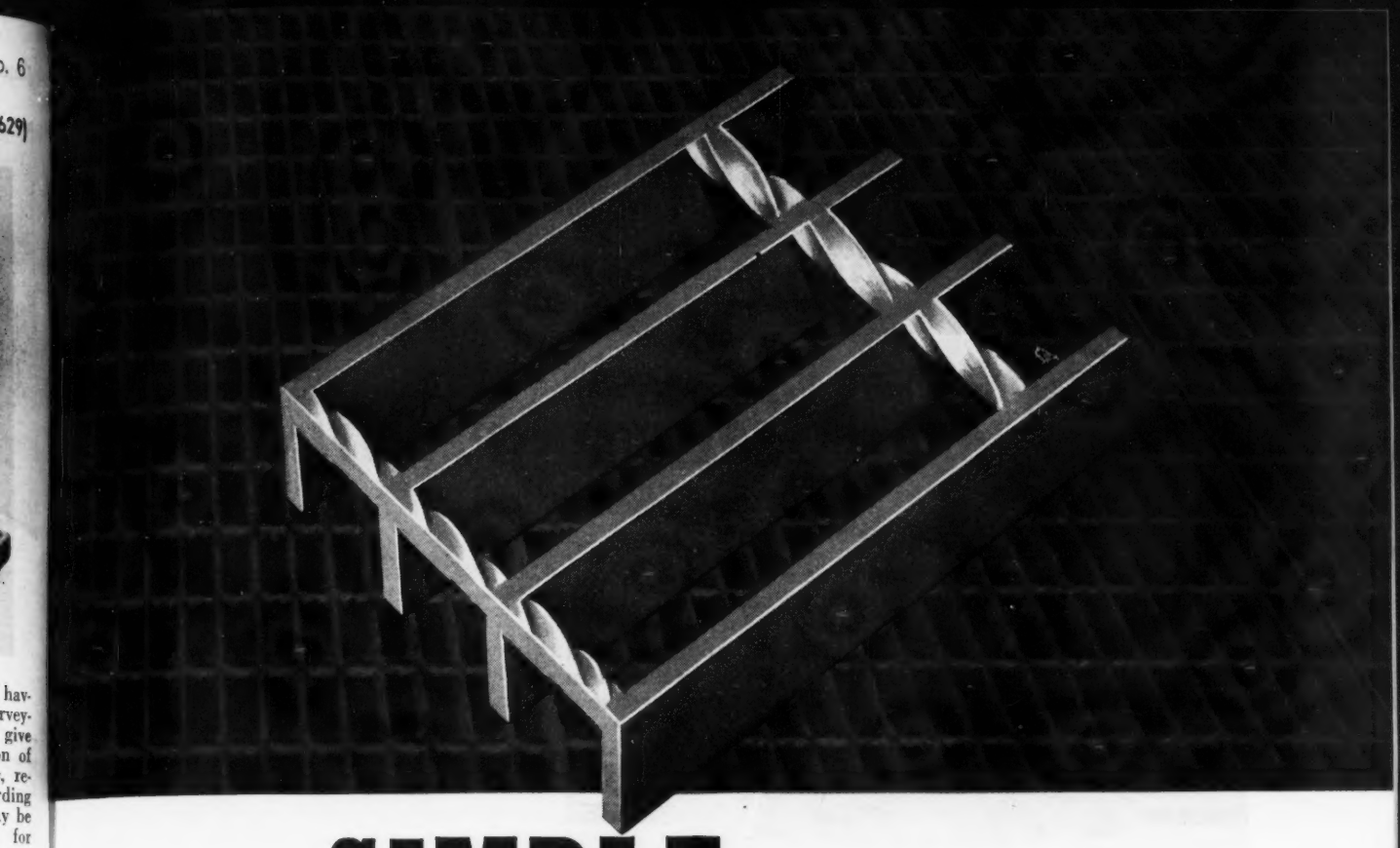
Plasticizer (630)

Resinous Products & Chemical Co. has announced commercial scale production of a low-temperature plasticizer for polyvinyl chloride. For vinyl coated fabrics such as those used in insulation jackets, the material is known as Dioctyl Sebacate and is said to be a high boiling, stable, light colored liquid, which combines low-temperature flexibility of dibutyl sebacate with non-volatility characteristics of dibenzyl sebacate. Standard polyvinyl chloride stocks containing 35% plasticizer show a low-temperature flexibility better than —70° C., according to the manufacturer.

Capacitors (631)

Capacitors utilizing an oil impregnant designated as Vitamin Q have been developed by Sprague Electric Co. and are said to operate satisfactorily at thousands of volts at ambient temperatures as high as 105° C. Leakage resistance at room temperature is 20,000 megohms.

Announcements of developments to come with reconversion are appearing now in your field—tools which will help you to do a better job. Manufacturers' publications are a quick, efficient way for you to keep posted on current events in the industry. American industry is offering a remarkable service—free. ELECTRICAL WEST makes it easy for you to secure this service. Check and mail coupon on p. 64. That's all you have to do to bring this information to you.



SIMPLE, *isn't it?*

Yes, it is, but there's no other grating like it for safety and long-term economy.

Actually Blaw-Knox Grating is a one-piece, electroforged steel "material" which can be made to measure or cut to fit . . . Note these exclusive features:

1. **Self-cleaning, no sharp corners to clog.**
2. **Maximum open area for light and air.**
3. **Easy to maintain . . . paint reaches entire surface.**
4. **Rigid electroforged construction means easy installation.**
5. **Twisted cross bar provides safe footing at all times.**

Write for complete catalogue on grating.

BLAW-KNOX DIVISION

Of Blaw-Knox Company

2098 FARMERS BANK BLDG., PITTSBURGH, PA.

NEW YORK, CHICAGO, PHILADELPHIA, BIRMINGHAM, WASHINGTON

Representatives in Principal Cities

COAST TO COAST SERVICE

BLAW-KNOX ELECTRO FORGED GRATING

ALABAMA
Birmingham—McConnell Sales & Engineering Corp.

CALIFORNIA
Los Angeles—E. M. Ornitz
San Francisco—W. S. Wetenhall Co.

COLORADO
Denver—Mine & Smelter Supply Co.

DISTRICT OF COLUMBIA
Washington—Meloney Engineering Co.

FLORIDA
Tampa—Ellis & Loew

GEORGIA
Atlanta—Evans L. Shuff

INDIANA
Indianapolis—Hugh J. Baker & Co.
South Bend—Edwards Iron Works, Inc.

IOWA
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Baltimore—H. T. Potts Co.

MASSACHUSETTS
Boston—Brown-Wales Co.
Holyoke—Massachusetts Supply Corp.

MICHIGAN
Detroit—Wm. P. Favorite

MINNESOTA
St. Paul—Robert J. Wylie

MISSOURI
Kansas City—W. R. Fithian
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TEXAS
Houston—James A. Hall

UTAH
Salt Lake City—Harrison & Co.

VIRGINIA
Richmond—W. H. Trausneck
Roanoke—Milliken Co.

WASHINGTON
Seattle—Geo. Montgomery

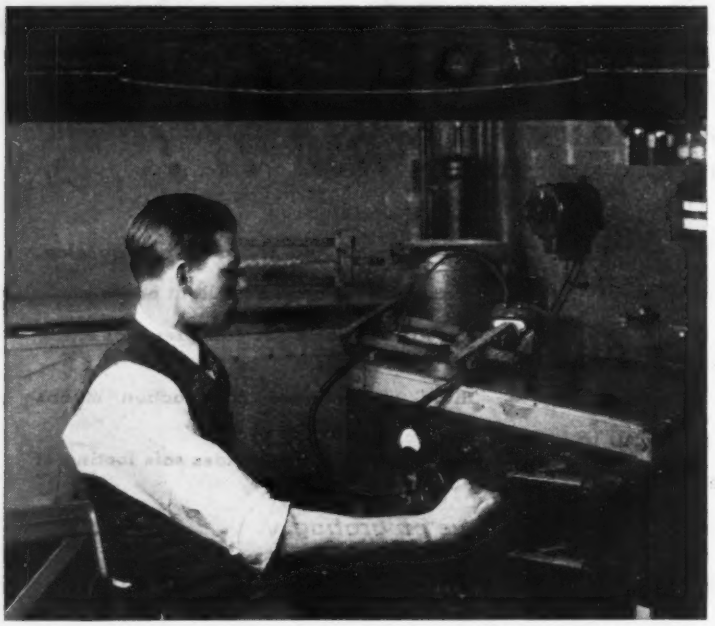
WEST VIRGINIA
Charleston—Fireproof Products Co.

WISCONSIN
Milwaukee—Hunter Tractor & Machinery Co.

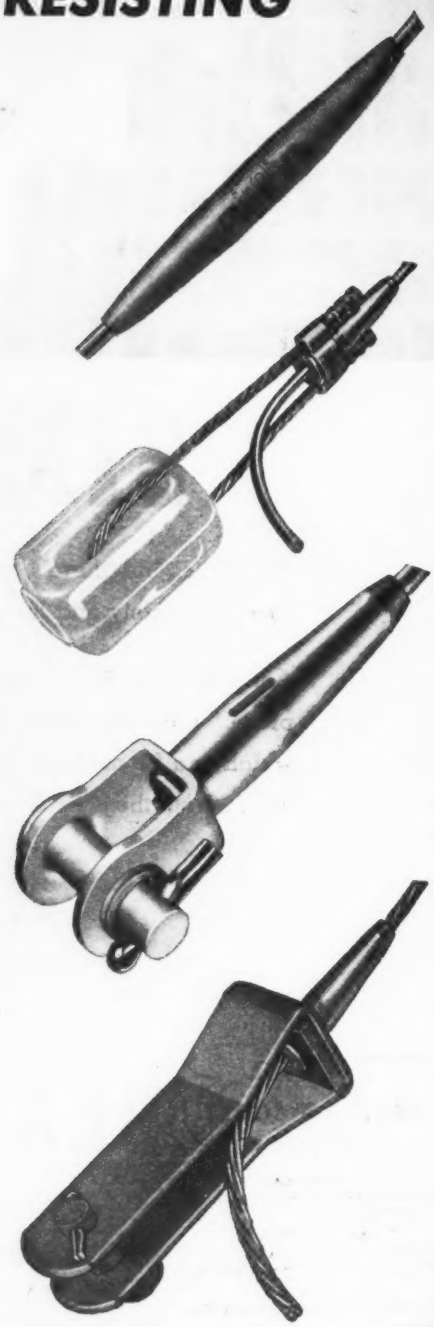
3RD TEST OF A SERIES

proves that Reliable STRAIGHTLINE SPLICES AND DEAD ENDS ARE CORROSION RESISTING

Reliable's policy of systematic testing also includes a relentless battle against the common enemy "corrosion". Specimens of Reliable Connectors, Splices and Deadends are constantly subjected to salt spray and acid vapor tests and checked for conductivity. This conductivity is excellent in tests equalling more than a lifetime of atmospheric corrosion. Note the actual test specimens below.



Above photograph shows actual corrosion test and equipment devised by Reliable engineers to best study this important test requirement



Seeing is believing—watch for other test proof

1. Gripping Test
2. Vibration Test
3. Corrosion Test
4. Conductivity Test

RELIABLE ELECTRIC COMPANY, CHICAGO

OVER 35 YEARS SERVICE TO THE UTILITIES

Shell Inhibited Turbo Oils are refined from carefully selected crudes . . . they're turbine oils from the ground up

Shell inhibited turbine oils have shown little or no trace of OXIDATION *after years of service in marine, industrial and public utility installations. They have completely prevented* RUST FORMATION, *and have resisted* STRUCTURAL BREAKDOWN *over similar periods—far surpassing the performance of replaced oils.*

To achieve anti-oxidation properties, rust-preventing quality, demulsibility and the stability for long service, these oils are developed exclusively for turbine lubrication *from the ground up.*

Starting with carefully selected crudes, Shell refines these base stocks by a solvent extraction process to enhance the oil's inherent stability and demulsibility.

At the compounding stage, the oil is fortified with Shell-developed additives . . . special ingredients which, more than anything else, have established Shell Inhibited Turbo as a superior turbine oil.

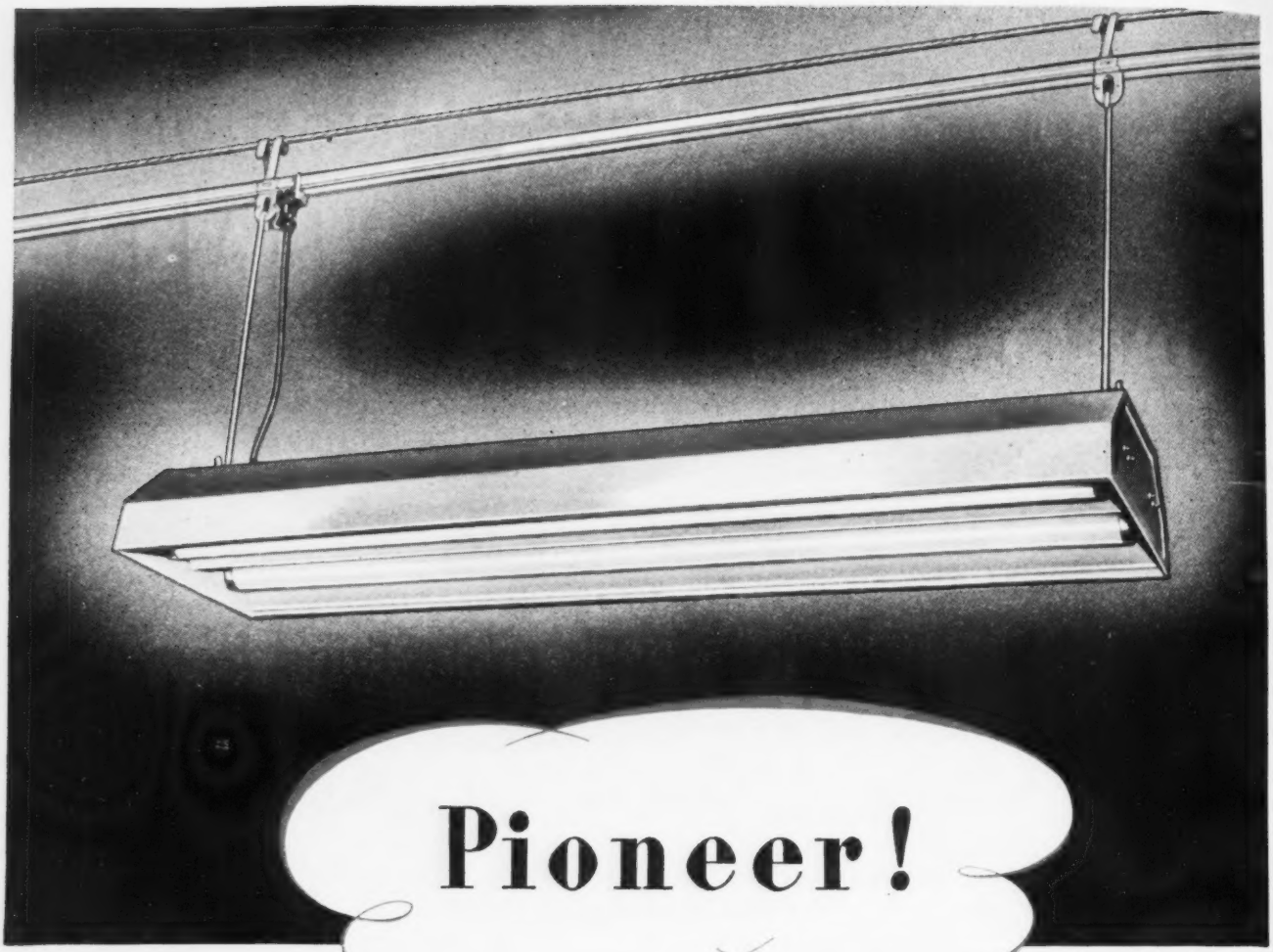
A rare anti-oxidant additive is introduced, greatly increasing the oil's naturally high oxidation resistance. Then, to give exceptional rust-preventing quality, Shell adds another compound which assures both maximum metal-covering ability and high film strength.

For dependable turbine lubrication, rely on Shell Turbo . . . the inhibited oil with anti-oxidation and anti-rust additives. Shell Oil Company, *Incorporated.*

Oil is Ammunition
. . . use it wisely

SHELL TURBO OIL
(INHIBITED)

Shellengineered for the job



Pioneer!

BULLDOG UNIVERSAL TROL-E-DUCT

For Completely Flexible Lighting

A thoroughly modern, flexible system of factory lighting pioneered by BullDog—already proved in vital war industries!

Light where it is needed—close to the job—helps both production *quality* and production *quantity*. With BullDog Universal Trol-E-Duct, you can add new lights or re-locate present ones without re-wiring — immediately and wherever needed.

You can even move the whole system anywhere in your plant to accommodate changes in production set-ups. It is prefabricated and built in standard sections—100% salvable, too, nothing to scrap.

Investigate Universal Trol-E-Duct for *your* plant. Adaptable to any type of lighting—fluorescent, mercury vapor or incandescent. Consult expert BullDog field engineers, or write for descriptive folders.

BUY WAR BONDS

BULLDOG

ELECTRIC PRODUCTS COMPANY

SALVAGE PAPER

BOX 177, R. PK. ANNEX, DETROIT 32, MICHIGAN. In Canada: BullDog Electric Products, Ltd., Toronto. Field Engineering Offices in All Principal Cities.

Also Manufacturers of

Vacu-Break Safety Switches—SafToFuse Panelboards—Switchboards—Circuit Master Breakers — BUStribution DUCT, for "plug-in" power—Industrial Trol-E-Duct, for movable "loads."

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

flexible capacity

TO MEET POSTWAR LOADS

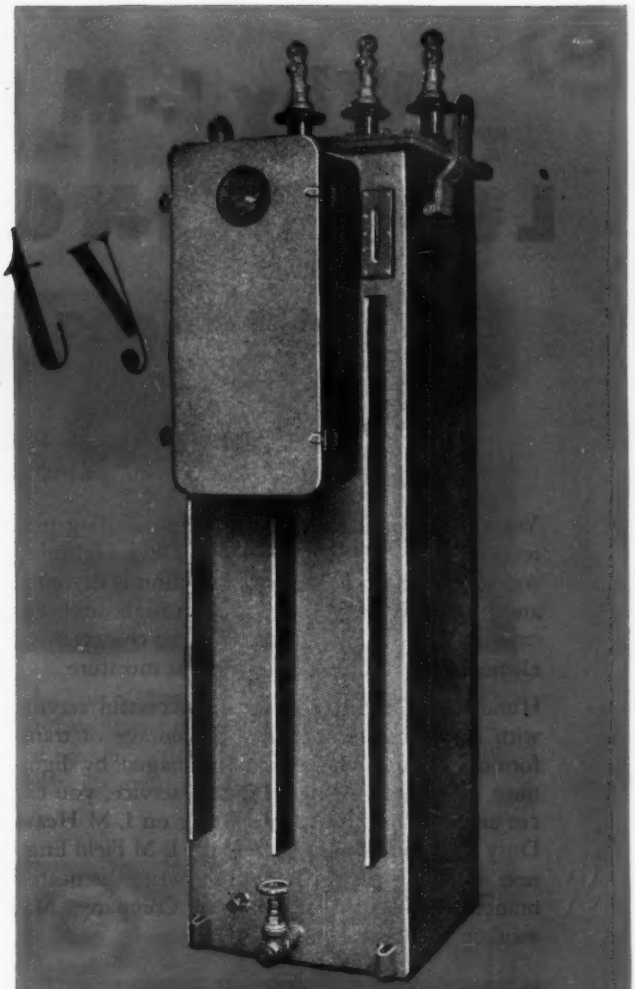
. . . with the help of Westinghouse Voltage Regulators

Greater domestic loads and sudden population shifts will create fluctuating postwar power demands on available capacities all over the nation. These shifting loads can be met more easily—frequently without altering generating or transmission facilities—by proper and adequate use of voltage regulators.

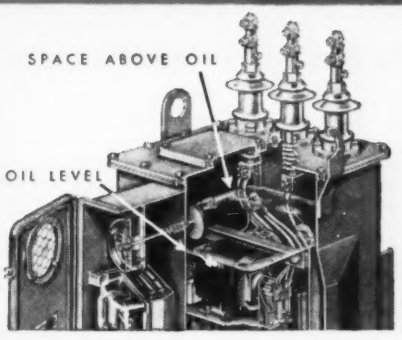
Westinghouse regulators make possible close control of voltage at low cost. New load problems can be solved quickly and flexibly, often eliminating extra lines and new generators.

Westinghouse feeder regulators meet every type of power application . . . step-type regulators for power and transmission lines: liquid-cooled induction feeder-type for outdoor and indoor use; air-cooled for indoor applications. Sturdy, simplified construction reduces maintenance, prolongs life.

When you compare your capacity with your probable future loads, consider the application of voltage regulators before you expand existing lines or add new generators. Consult your nearest Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-10267



Type SU induction feeder voltage regulator for indoor or outdoor service. New regulating relay eliminates delicate pivots, pins, springs, and assures long life. Integral worm shaft construction, tapered roller bearings and dynamic braking mean high service continuity . . . entire operating mechanism is submerged in insulating oil.



Another Westinghouse exclusive! "Sealedaire" construction provides extra protection against entrance of moisture, eliminates high oil acidity, and prevents formation of explosive gases.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

VOLTAGE REGULATORS

Why L-M Heavy Duty LIGHTNING ARRESTERS give such long, unfailing protection

Years of service do not change the unfailing protection afforded by L-M Heavy Duty Lightning Arresters. A high degree of protection is designed and built into these arresters, with high discharge capacity, exceptional stability of the characteristic element, and double sealing against moisture.

Hundreds of thousands are in successful service, with an almost infinitesimal percentage of transformers or arresters reported damaged by lightning. If you are not getting this service, you can cut arrester costs by standardizing on L-M Heavy Duty Lightning Arresters. Ask the L-M Field Engineer who calls on you; or call or write the nearest branch office, or Line Material Company, Milwaukee 1, Wisconsin.

Handles Heavy Surges Easily

Instant Response: The electrically fast ladder gap goes into action early, before the surge can build up to a dangerous value. The gap is a precision device, with quick response to steep wave fronts.

Low IR Drop: On a 10,000-ampere surge, IR drop is only 16.9 Kv; and is but slightly higher on much greater surges. This assures protection to the transformer with a large safety factor.

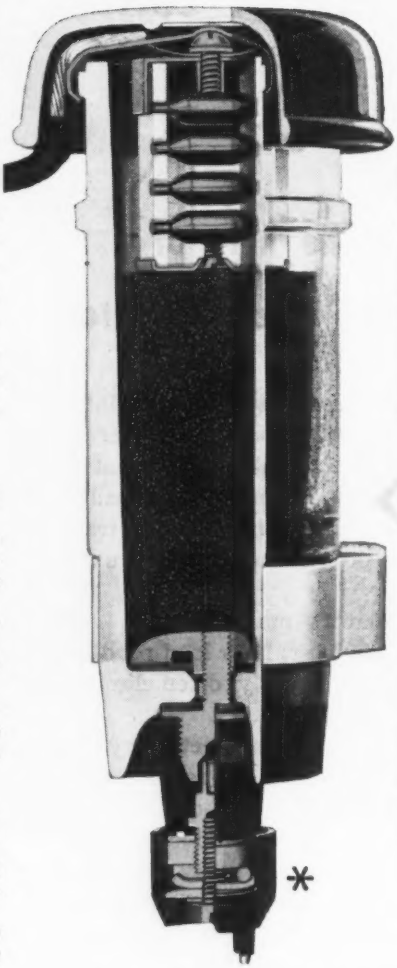
High Discharge Capacity: L-M Heavy Duty Lightning Arresters handle, without damage, the 65,000-ampere surge specified in NEMA and AIEE standards, showing their high discharge capacity.

Handles Them for a Long, Long Time

High Stability: The characteristic element is electrically and chemically stable, and permanently retains its high discharge capacity and resistance to follow current.

Double Sealing Against Moisture: Top and bottom of the arrester housing are sealed by long-life synthetic rubber gaskets, compressed against the glass. In addition, a weather-resisting compound *seals the seals.*

Heavy Duty Construction: The arrester is built for heavy duty throughout. An example is the precision ladder gap, with electrodes of solid brass bar machined to size, exactly spaced and held in position by steatite insulators. Its electrical characteristics are unaffected by discharges.



Upper Moisture Seal—long-life synthetic rubber gasket, double-sealed with weather-resisting compound.

Precision ladder gap—goes into action fast; electrical characteristics not affected by discharges.

Characteristic element in form of a solid block molded into the Pyrex* glass (or porcelain) housing; is absolutely stable.

*Reg. trade mark

Lower synthetic rubber moisture seals; double-sealed with weather-resisting compound.

Mechanically strong solderless connector for ground lead.

*"**The Isolator**"—an exclusive L-M feature under Pat. 2,315,300.

Meet New NEMA Standards. All L-M Heavy Duty Lightning Arresters meet the new NEMA standards. In repeated tests, these L-M Arresters maintain uniform performance characteristics.

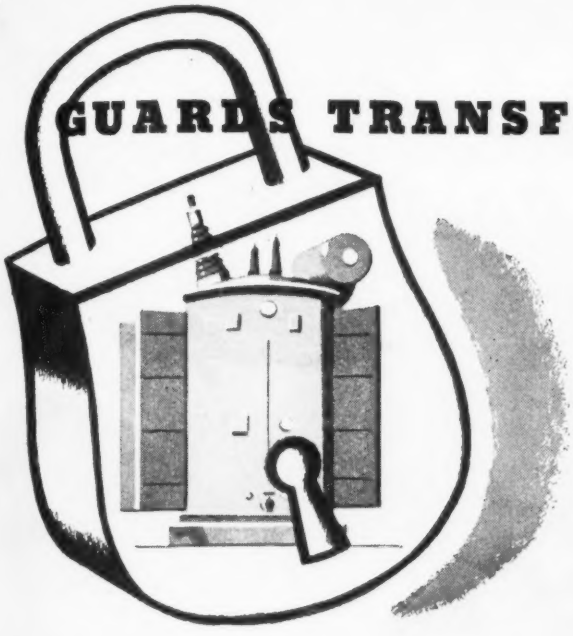
Made in Six Sizes. L-M Heavy Duty Lightning Arresters are made in 6 sizes with ratings from 1 to 15 Kv.

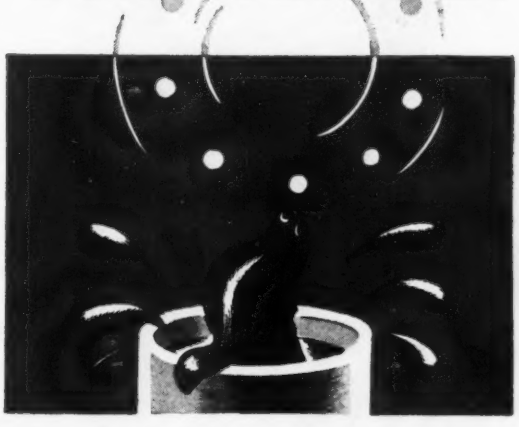
LM

LINE MATERIAL
LIGHTNING ARRESTERS

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street Lighting Equipment

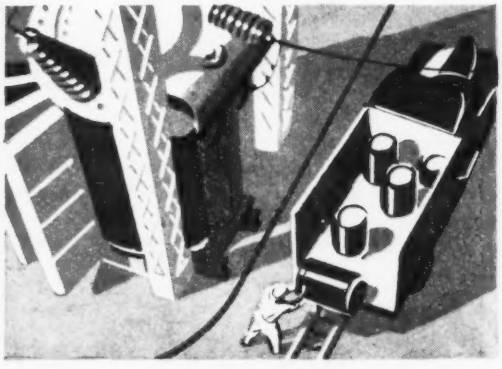
GUARDS TRANSFORMERS AGAINST DUAL DANGER!





1. The modern heavy-duty transformer needs protection from heat and from electric power loss. To guard against this dual danger, Union developed Red Line Transformer Oil.

2. This oil has outstanding oxidation stability and sufficient fluidity to allow a rapid transfer of heat at all times. Its high flash point means extra insurance against fire.



3. By the most careful refining and handling, moisture and impurities are excluded from this oil to guarantee, on delivery, a dielectric strength of 27,500 volts minimum.

4. Union Oil Company has worked closely with the principal manufacturers of transformers so that the needs of users could best be served. Red Line Transformer Oil is the result.

You can get a supply of Red Line Transformer Oil from your local Union oilman. And he will gladly tell you about this and any of the other 492 Union Oil quality products.

RED LINE TRANSFORMER OIL

UNION 76

Another **UNION OIL** *Success-Tested Product*

● *Skimming over forests, jungles or open country . . . hurdling mountains, valleys, rivers, our Army Air Forces can lay combat telephone wire (Okonite plants make thousands of miles a month) at speeds up to 110 miles an hour. Using equipment developed by the Signal Corps, two continuous five-mile circuits can be paid out during a single flight of a light "grasshopper" plane.*

but here's where *OUR* speed counts

● At home the 7th War Loan is on . . . one mighty effort instead of the two we had up to this time last year . . . a challenge to all of us in industry to get quickly and solidly behind our local bond drive.

Sure — it's a big job to top our quota. Everything about this war is big including our responsibility to those in uniform. Our fighters are depending on us at home to put our job over. It's the least we can do for them — and the War Bond purchase window is the place where your speed counts most now.

OKONITE "SINCE 1878"

OKONITE

ARMY (E) NAVY

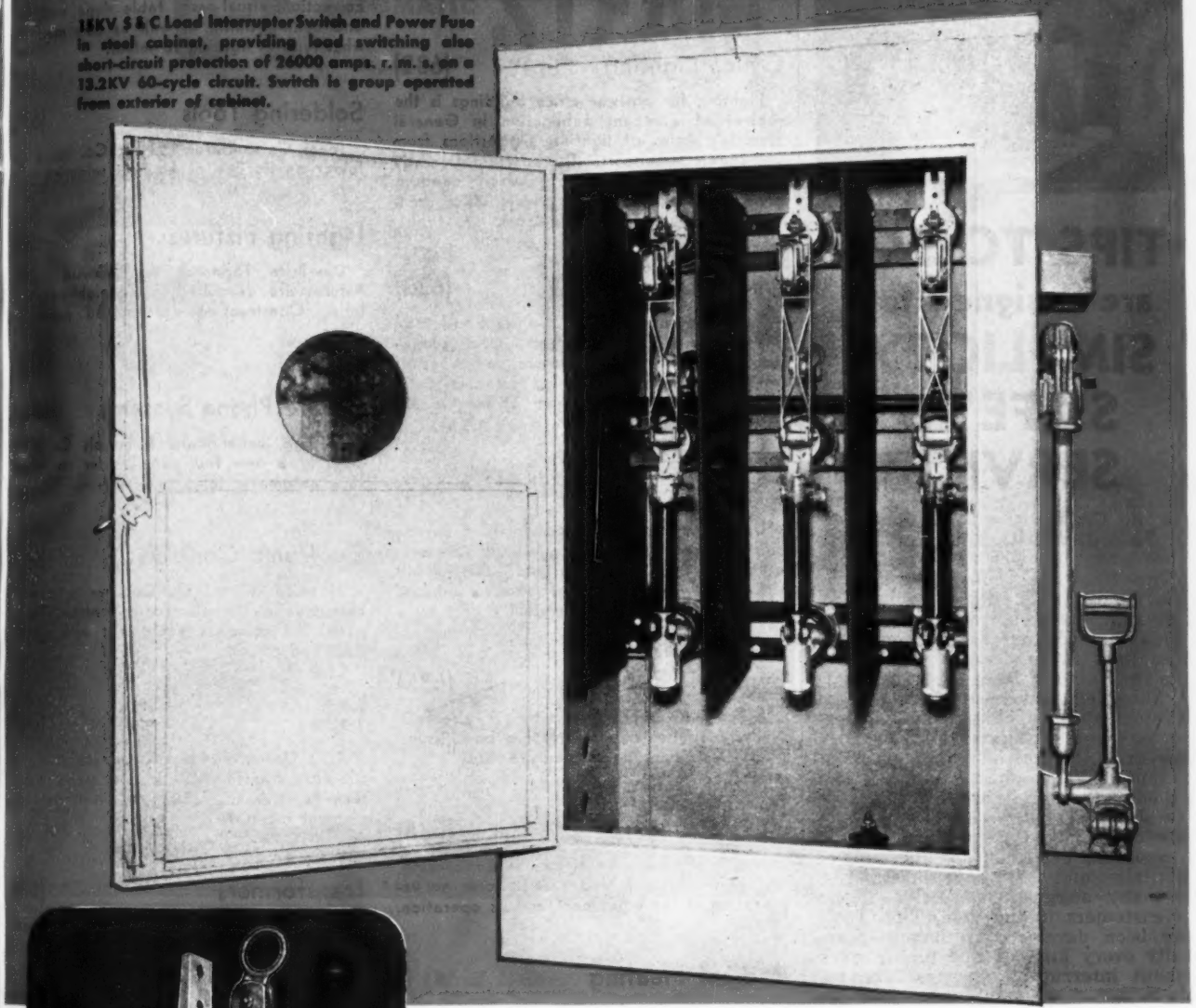
insulated wires and cables including combat wire

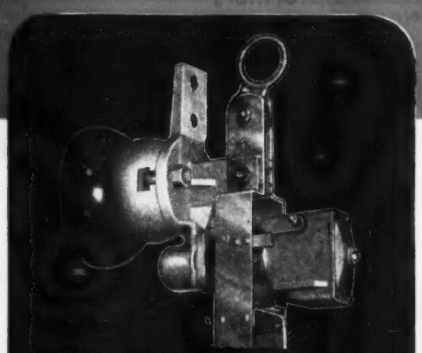
The Okonite Company, Passaic, N. J. • Okonite-Callender Cable Co., Inc., Paterson, N. J. • Hazard Insulated Wire Works Div., Wilkes-Barre, Pa.

4081

THIS IS THE TREND

15KV S & C Load Interrupter Switch and Power Fuse in steel cabinet, providing load switching also short-circuit protection of 26000 amps. r. m. s. on a 13.2KV 60-cycle circuit. Switch is group operated from exterior of cabinet.





The new Interrupter Unit clears circuit in cycle or less

The opening movement of the switch blade actuates the Load Interrupter Unit mechanism separating the Interrupter terminals at high speed and interrupts the load without drawing any arc between line contacts of the Disconnect Switch.

Today power company customer installations are being made with S & C Load Interrupter Disconnect and Power Fuse Combinations. Enclosed in steel cabinets, they occupy little space, are easy to install and maintain—yet provide thoroughly reliable short-circuit protection and *switching under load conditions* without drawing an arc external to the switch contacts.

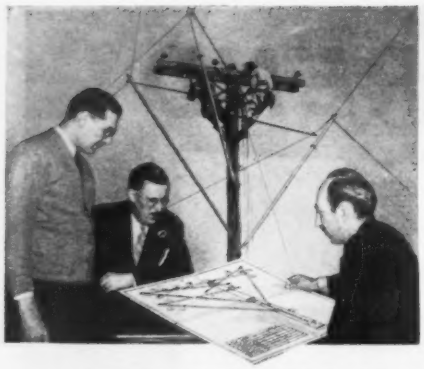
They are made in ratings to 400 amperes, 7.5 KV and 15 KV. Consult your nearest S & C sales engineer for detail data,—or write for Bulletin 202-A.

SCHWEITZER & CONRAD, INC.

4425 Ravenswood Ave., Chicago 40, U. S. A.

Supplied in Canada through Powerlite Devices, Ltd., Toronto, Ont.

LOAD INTERRUPTER DISCONNECT SWITCH and FUSE COMBINATION



TIPS TOOLS
are designed for
SIMPLICITY
SAFETY
SERVICE

A. B. Chance Company Engineers and Field Demonstrators are hard to please when it comes to the designing of Tips Hot Line Tools. They demand the ultimate in simplicity of operation, safety and serviceability.

This method for working on three phase lines is an example of the results they obtain. It is one of the safest, most efficient means yet devised for moving and holding live conductors at a safe distance while defective cross arms, broken insulators or damaged poles are replaced. In fact, this method has defied improvement for several years.

By combining the practical experiences of our field men and the skill of our design and testing engineers with the many suggestions received from our customers in the field, Tips Tools have been developed to handle practically every kind of line repair work without interrupting service. The result is that most maintenance jobs can be done "hot" with Tips Tools quicker and easier than they can be done "cold." There is no loss of revenue, no disgruntled customers, no time wasted in obtaining clearances, grounding, etc., and the men who do the work are actually safer than they would be working on a supposedly "cold" line, risking the possibilities of unexpected current surges.

A·B·CHANCE CO. CENTRALIA MISSOURI

BULLETINS
data books, etc.

Office Lighting (632)

Lighting for postwar office buildings is the subject of a recent publication in General Electric's series of lighting suggestions from well-known architects. This presentation by William Edward Kapp of Detroit contains plans for reception room, private office, general office, hallways and elevators.

Electric Heating (633)

Wesix has prepared a 20-page booklet on electric heating. Exterior and interior photographs showing sizes of houses and types of installation are accompanied by cost data. Floor plans showing locations of heaters are given for two of the houses.

Bus Structures (634)

Delta-Star has a new folder on its reinforced high-voltage bus structures. These structures were designed to withstand short-circuit stresses where currents of several hundred thousand amperes are a possibility.

Synthetic Rubber (635)

A ten-page booklet describing "Fairprene" synthetic rubber sheet stocks has been issued by E. I. du Pont de Nemours & Co.

Wire Recording (636)

Lear is offering a booklet on wire recording, giving in questions and answer form an explanation of the equipment and its operation.

Radiant Heating

A 54-page booklet on radiant heating is being distributed by the A.M. Byers Co., makers of wrought iron pipe. Section headings include history, theory and advantages of radiant heating, calculation and design of installations, selection of pipe.

Drafting Room Light (638)

In a recent issue of "Architexts", Holophane discusses drafting room lighting. Pointing out that good seeing conditions include more than good lighting, the folder touches on eyesight correction, visual rests, table slope, wall, floor and ceiling finish, as well as how much and what type of lighting to select.

Soldering Tools (639)

Ideal Commutator Dresser Co. has a new folder on its line of electric soldering tools.

Lighting Fixtures (640)

Day-Brite Topnotch and Viz-Aid lighting fixtures are described in an eight-page bulletin. Construction details and prices are given.

Private Phone Systems (641)

Kellogg Switchboard & Supply Co. is circulating a new four-page folder on its private automatic telephone systems.

Electronic Controls (642)

Wheelco Instruments Co. has prepared a catalogue on its electronic controls. The 12 pages list company equipment with descriptions and prices.

Tape (643)

R. E. Uptegraff Mfg. Co. describes its distribution transformers in a 32-page booklet recently released. Tables and illustrations supplement the text.

Transformers (644)

B. F. Goodrich Co. has prepared a broadside on its Koroseal tape. Composition of Koroseal and some of its uses are given.

Plastics (645)

DuPont plastics are described in an eight-page booklet. Data are included on polythene, nylon, plastacele, pyralin, butacite and lucite.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

600	601	602	603	604	605	606	607	608	609	610
611	612	613	614	615	616	617	618	619	620	621
622	623	624	625	626	627	628	629	630	631	632
633	634	635	636	637	638	639	640	641	642	643
644	645									

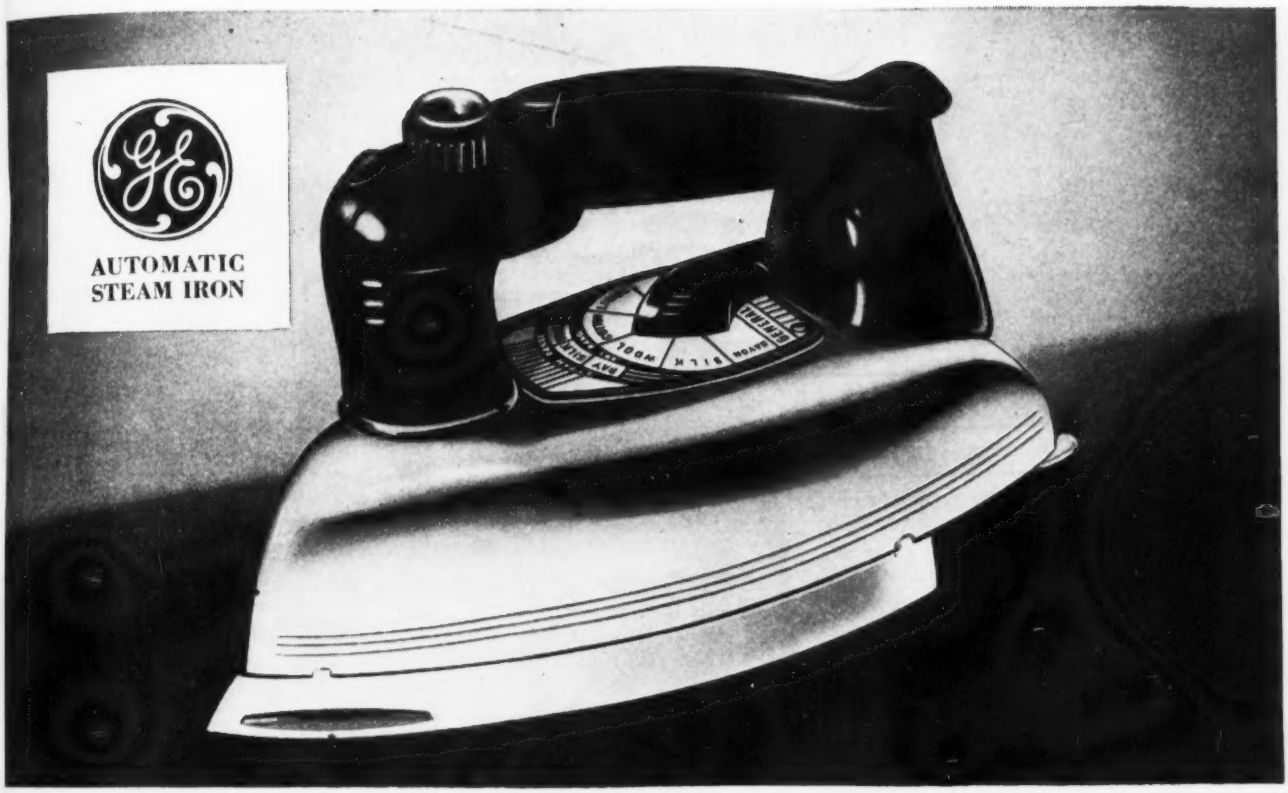
Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Get set for a swing to Steam Ironing with the

G-E AUTOMATIC STEAM IRON



It's the *only* Steam Iron with the *Calrod Heating Unit—permits changing from steam to dry ironing at any time!*

And it has all these *extra* G-E features!

- **Steam-control varies the amount of steam to suit the fabric.**
- **G-E "Dial-The-Fabric" heat control.**
- **Double button nooks for ironing *under* buttons.**
- **Comfortable, cool handle with built-in thumb rest.**
- **Lightweight construction to cut ironing fatigue.**

Your Customers Will Want General Electric Steam Irons!

They'll be looking for the quality and dependability that have made G-E Irons *first choice* with women everywhere.

And they know steam ironing is the easiest ironing there is . . . that it's the best way to iron everything from light synthetic fabrics to heavy linens.

Start getting ready now! Plan your department with a full line of G-E Irons, and save a feature spot for the G-E Steam Iron. General Electric Co., Appliance and Merchandise Department, Bridgeport, Conn.

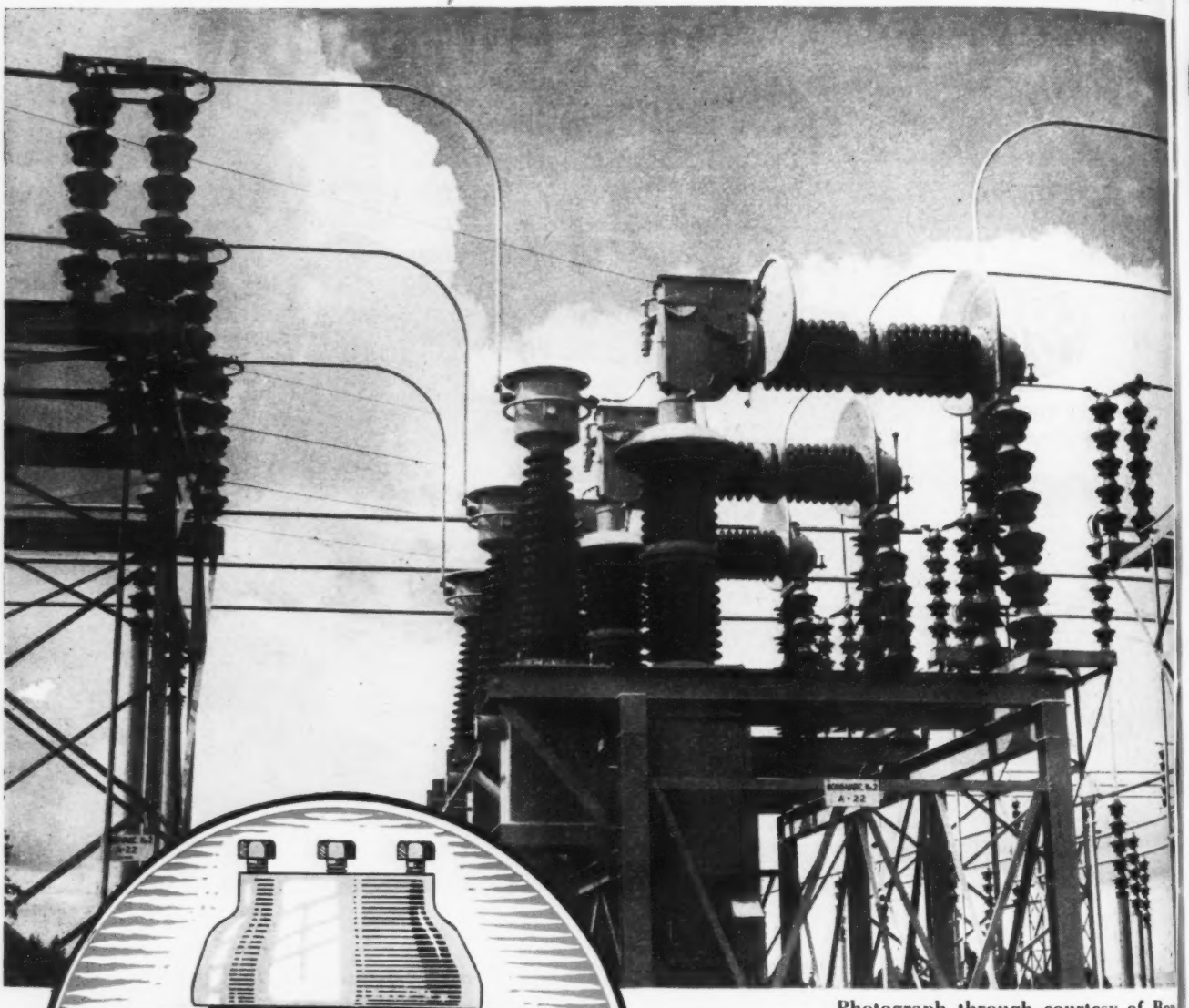
FOR FUN: *Don't miss Art Linkletter, in "The G-E House Party," every afternoon, Monday through Friday, 4 p. m., E.W.T., CBS. Other G-E programs are "The G-E All-Girl Orchestra," Sunday, 10 p. m., E.W.T., NBC. "The World Today," News, Monday through Friday, 6:45 p. m., E.W.T., CBS.*

For Final Victory—Buy And Hold More War Bonds

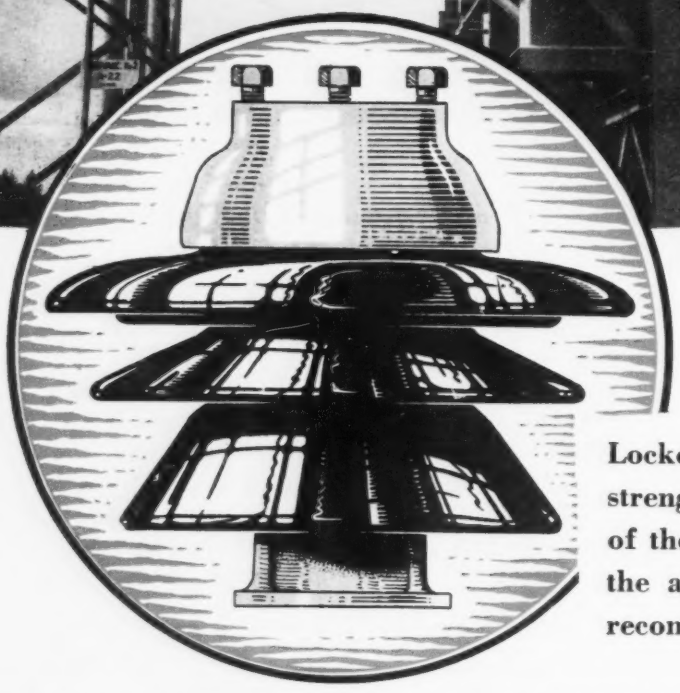
Everything electrical for better living in your home

GENERAL ELECTRIC

FOR MAXIMUM



Photograph through courtesy of Bonneville Power Administration.



Locke No. 7785, the original high strength switch type insulator. More of these units have been installed for the applications for which they are recommended than any other unit.

ORIGINATOR AND LARGEST MANUFACTURER OF WET-PROCESS PORCELAIN INSULATORS

LOCKE Insulator

FACTORS OF SAFETY....

BOTH MECHANICAL AND ELECTRICAL

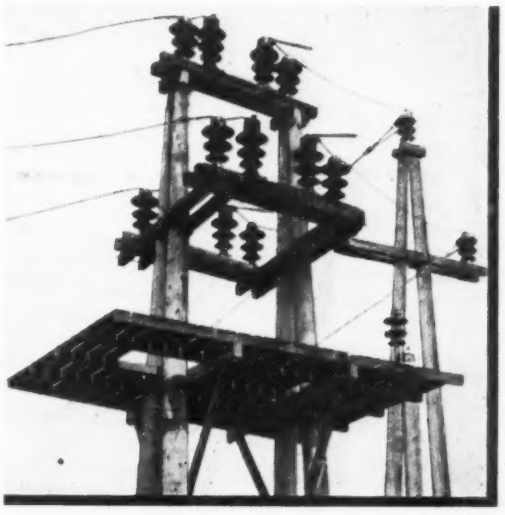
Specify LOCKE SWITCH-TYPE INSULATORS . . .

Locke switch type insulators have been standard for generations on many of the most important systems of the world because time has proved their superiority.

Today, more than ever, the name Locke on your switch insulator means longer, more satisfactory service because:

1. **The patented Locke compression glazing increases the resistance to damage from mechanical impacts and immunity to thermal shock.**
2. **The patented Locke compression sand—used in all assembly zones—improves the uniformity and stability of the unit and permits high working or transient loads.**
3. **The rugged design makes handling easier and construction quicker with less danger of breakage during installation or maintenance.**

All apparatus manufacturers will be glad to furnish these more reliable Locke switch insulators.



Locke switch insulators—vintage 1907

FIFTY PROGRESSIVE YEARS OF SERVICE TO THE ELECTRICAL INDUSTRY

Corporation BALTIMORE MARYLAND

Relighting a School at Low Cost

THE PROBLEM:

How to relight a school building which had been allowed to run down. This picture at the right shows one of the dingy classrooms with its lighting system "20 years behind the times."

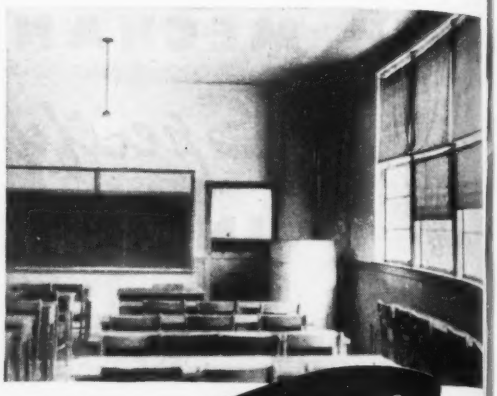
THE LIMITATIONS:

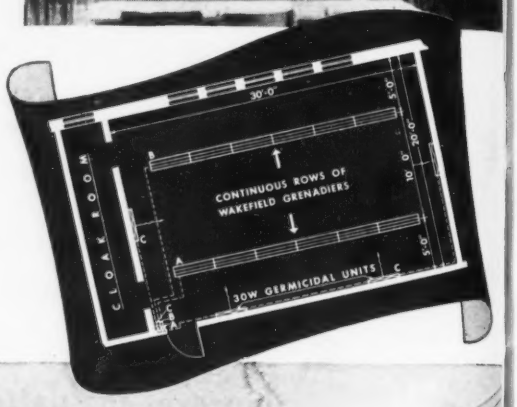
First and foremost, money. Funds had to be raised to swing the job since the school board did not have the money. Second, for the same reason, the installation must provide minimum cost operation. And rewiring must be kept to a minimum.

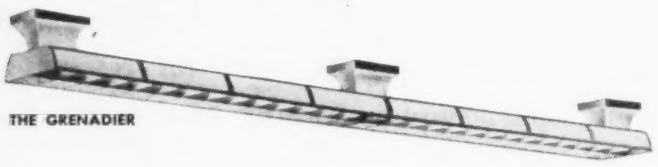
THE PLAN:

This typical classroom layout, drawn up by lighting engineers of Birmingham Electric Co., employs fluorescent lighting, with two continuous rows of Wakefield GRENADIERS. Through these units, considerable saving in wiring time was made, since wire could be run along as an integral part of the fixture. This also reduced to a minimum the ceiling outlets necessary (required about one-third the outlets needed for previous types of lighting). Separate switch controls were provided for the units nearest the window and for the inner row.

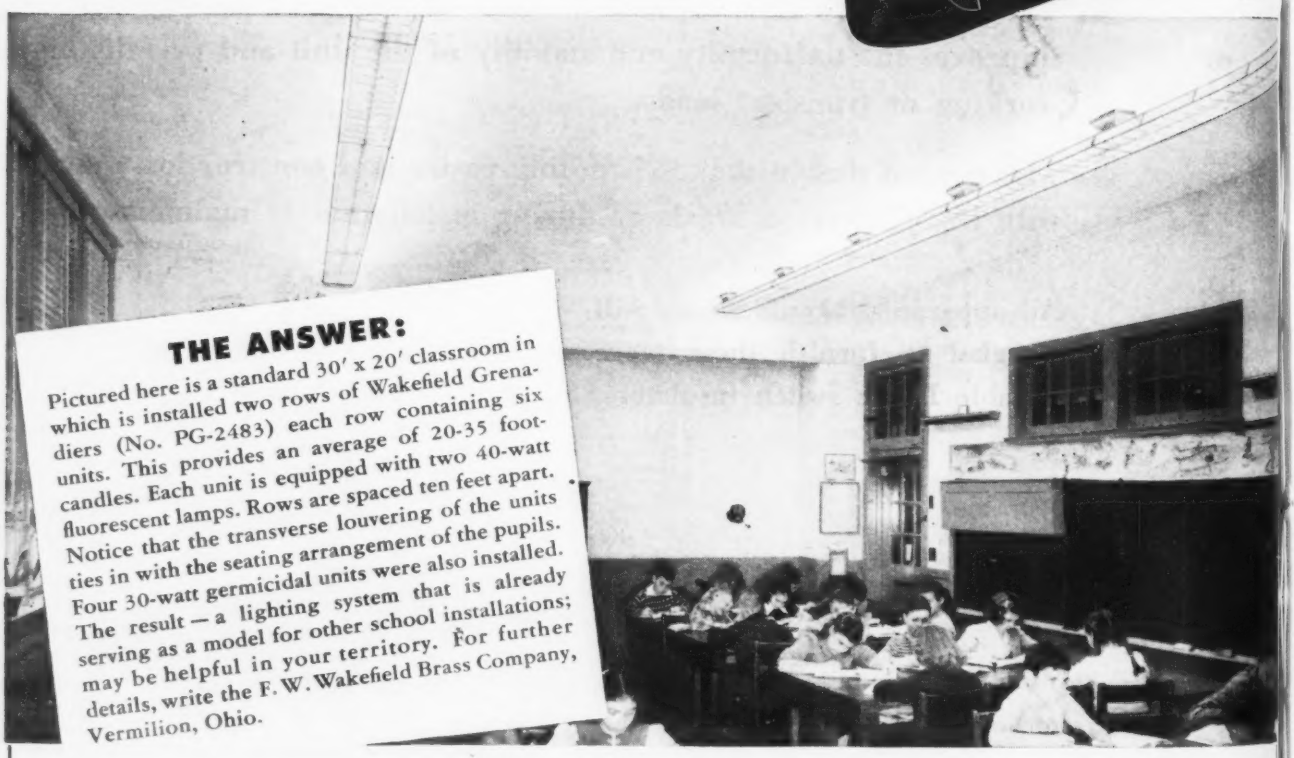
Shades-Cahaba School, Birmingham, Ala.







THE GRENADIER



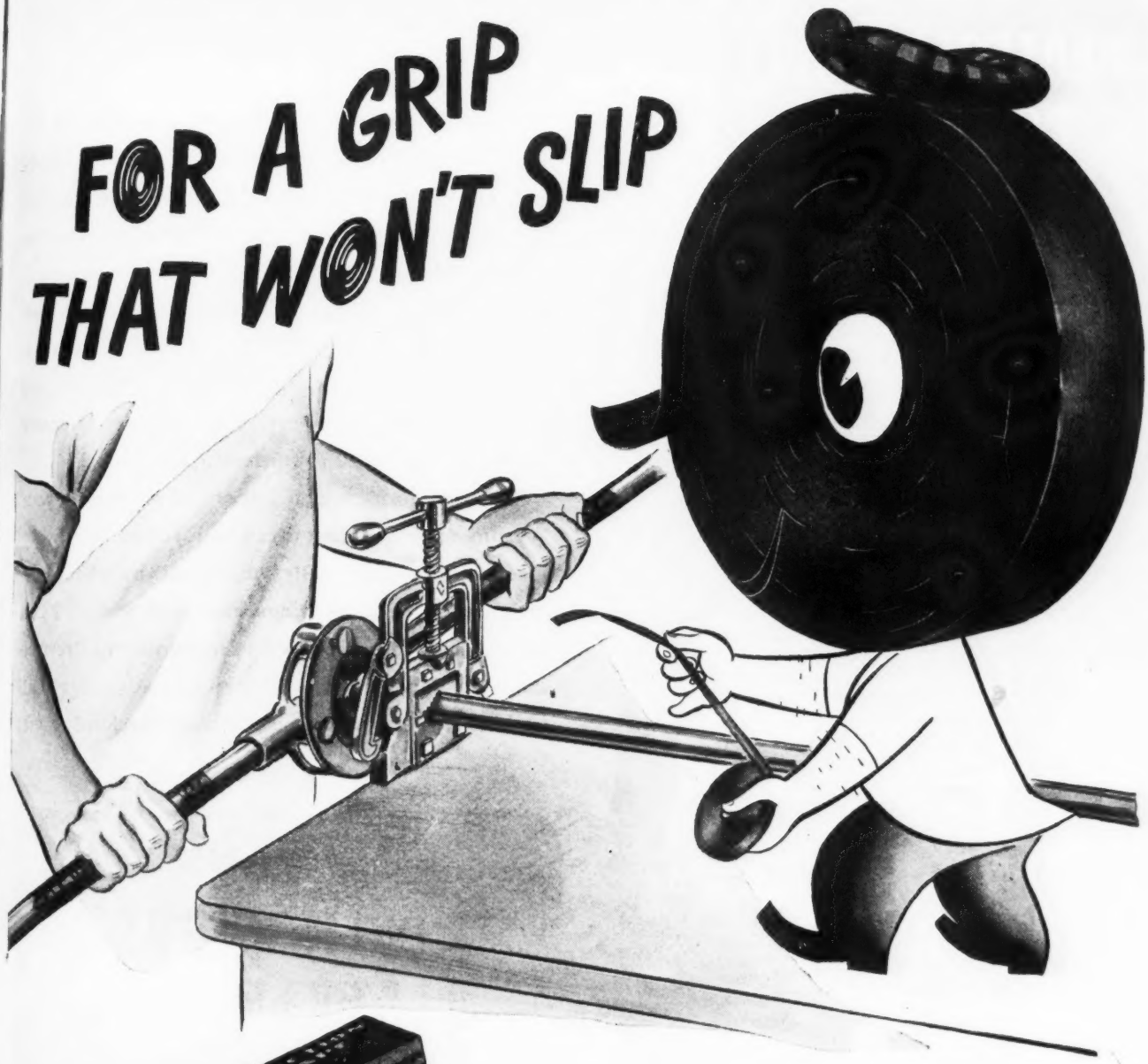
THE ANSWER:

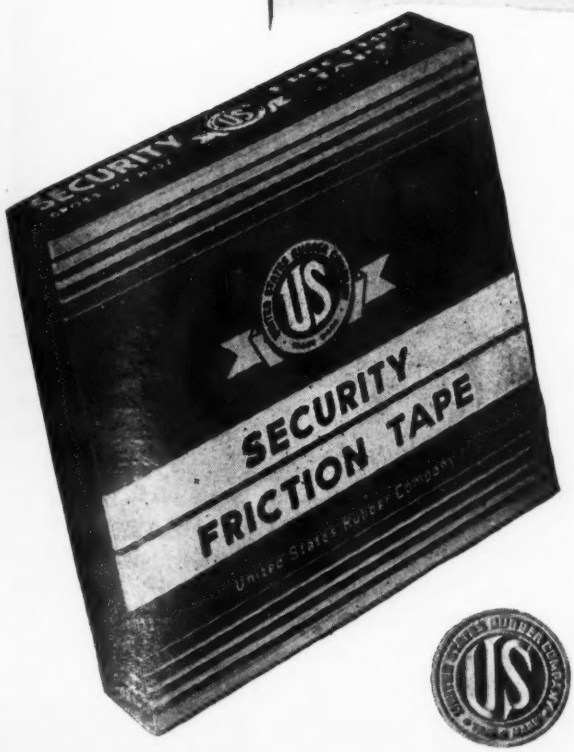
Pictured here is a standard 30′ x 20′ classroom in which is installed two rows of Wakefield Grenadiers (No. PG-2483) each row containing six units. This provides an average of 20-35 foot-candles. Each unit is equipped with two 40-watt fluorescent lamps. Rows are spaced ten feet apart. Notice that the transverse louvering of the units ties in with the seating arrangement of the pupils. Four 30-watt germicidal units were also installed. The result — a lighting system that is already serving as a model for other school installations; may be helpful in your territory. For further details, write the F. W. Wakefield Brass Company, Vermilion, Ohio.

Wakefield

ALSO THE GRENADIER . . THE ADMIRAL . . THE COMMODORE . . THE BEACON

FOR A GRIP THAT WON'T SLIP





Safety Tip: Threading pipe with a die stock is a ticklish job—a good grip is important. Old-timers know the trick of putting a few turns of U. S. Security Friction Tape on the handle. *Result:* a safer, easier grip, faster operation. Keep Security Tape within reach wherever you're working. It's a great little helper.

Play Safe—Use Security

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony program. CBS network, Sunday afternoons, 3:00 to 4:30 E.W.T.

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CSP Transformers offer just one of many ways your Westinghouse Distributor can help you to bring your plant up to par electrically. He can tell you what's new about a lot of other things electrical, too . . . can suggest many practical ways to modernize or "revitalize" old equipment or methods to your advantage. Call on his help for a complete electrical checkup! J-70447

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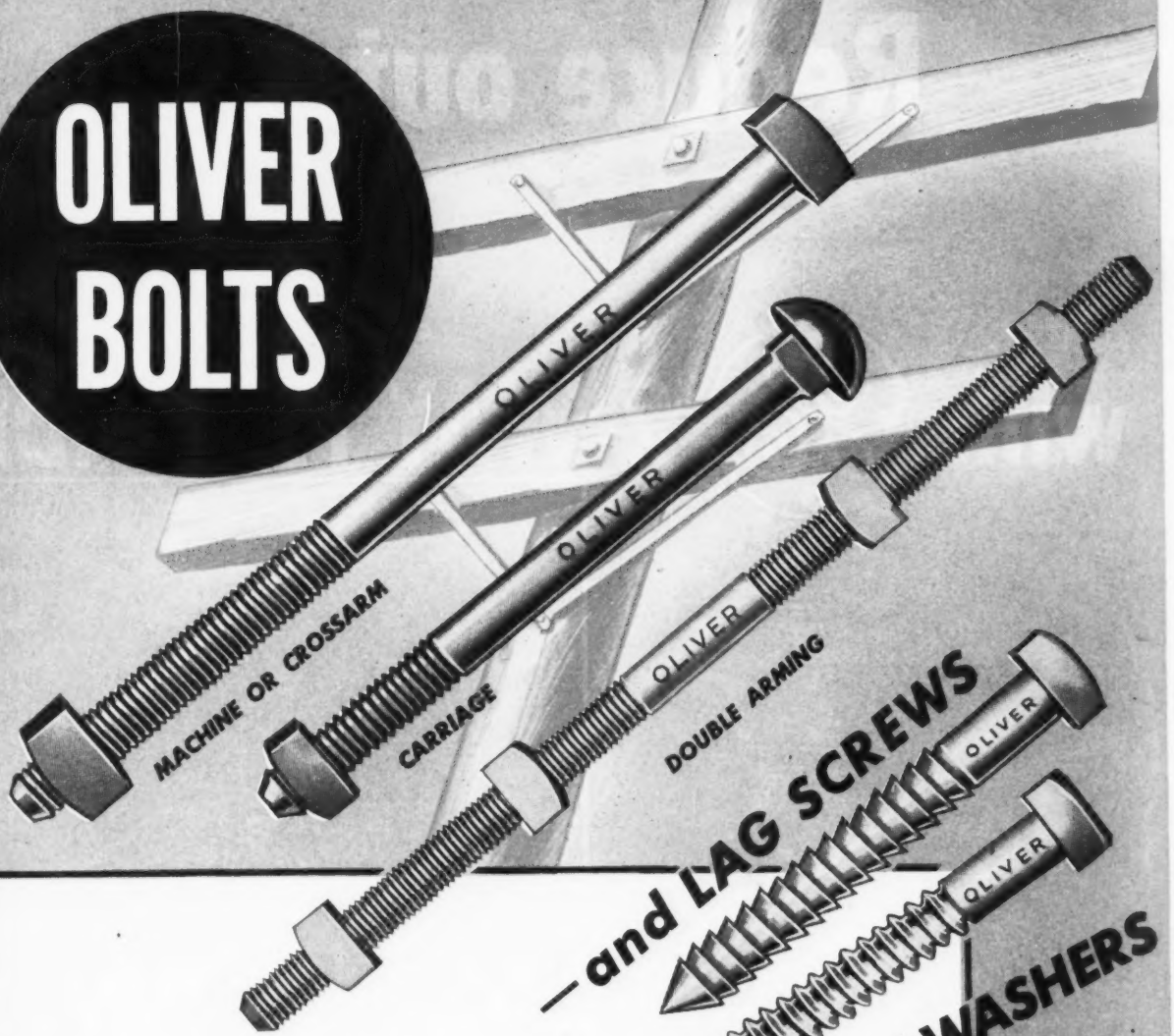
TWENTY-ONE OTHER WAYS your Westinghouse Distributor can help you in planning electrical modernization, whether for a single department or your entire plant, are suggested in this new book. It provides a valuable check list on modern electrical practices . . . from incoming power to methods of utilization and control. Ask your Westinghouse Distributor today for a copy of B-3476. Or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

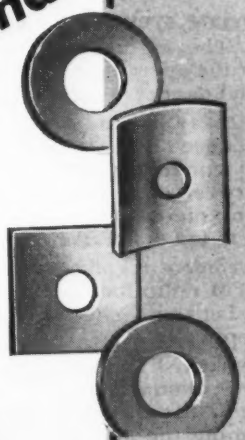
from the complete line of OLIVER POLE LINE MATERIALS...

OLIVER BOLTS



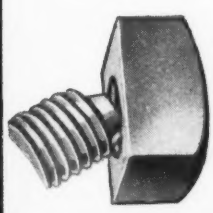
-and LAG SCREWS

-and WASHERS



Speed-pointed Oliver Bolts are made from new open-hearth steel. Heads are of proper size to develop full strength of bolts; threads are accurately rolled to uniform size and depth; galvanized coating is applied by a centrifugal process which removes excess spelter and insures free-running threads.

The Oliver line of bolts is complete in diameters and lengths. Lag Screws and Washers also available in popular sizes and styles.



The Oliver Speed Point makes threading-on of nuts faster, protects end threads when driving out for salvage.

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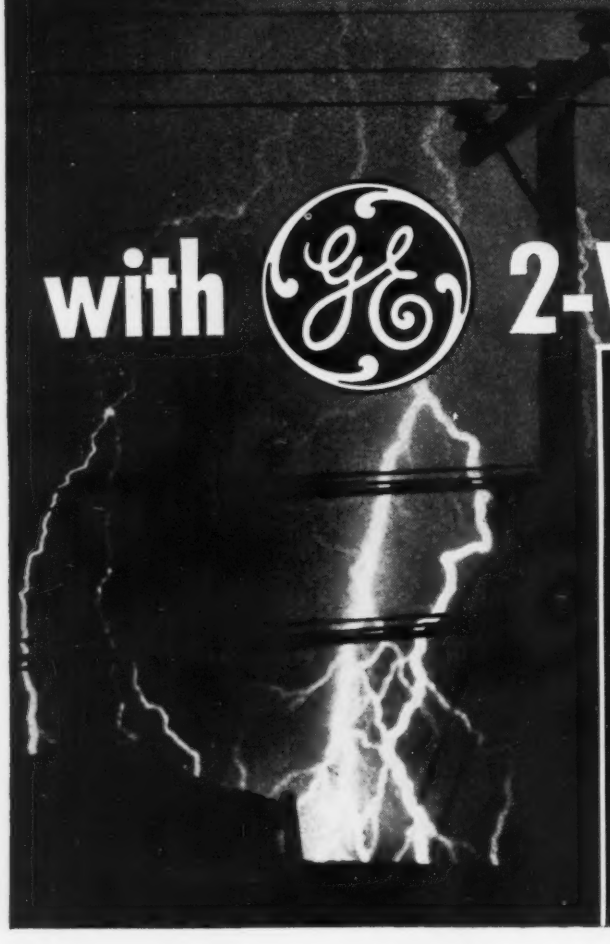
Reduce outage...

with G-E 2-WAY FM RADIO



THE STORM STRIKES. A crashing tree weighs heavily on a feeder. The night dispatcher calls the maintenance crews nearest the affected area and within minutes each point of potential danger is located and isolated.

G-E 2-way FM radio can help your maintenance department reduce outage. It will provide a sure means of instantaneous communication between dispatcher and field crew and between each field crew and every other. It will enable the same maintenance crews to serve wider areas. It will definitely lower service costs.

Government regulations now permit new installations of 2-way FM radio for important requirements of utility companies. Let your General Electric representative help prepare your applications.

Ask your G-E sales engineer how G-E 2-way FM radio can improve communication in your particular system. He will be glad to discuss your problems and have a specialist assist in planning the most effective and economical installation for your needs. *Electronics Department, General Electric Company, Schenectady 5, New York.*

Everything for 2-Way Radio

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they all agree on

...because THESE INDUSTRIAL FLUORESCENT FIXTURES OFFER GREATEST ALL-AROUND ADVANTAGES YET CONCEIVED

In MITCHELL-lighted plants everywhere, *workers* see better . . . do more . . . tire less. Up goes morale. Up goes production. But that's not all. *Maintenance men* find MITCHELL units easier to mount . . . simpler to service. *Plant owners* are quick to recognize these benefits. They heartily "O.K." the sound engineering . . . the rugged durability . . . the true economy of these certified fixtures. In the complete MITCHELL line of 2-40 watt, 3-40 watt, and 2-100 watt models they find the right answer for their particular lighting problem.

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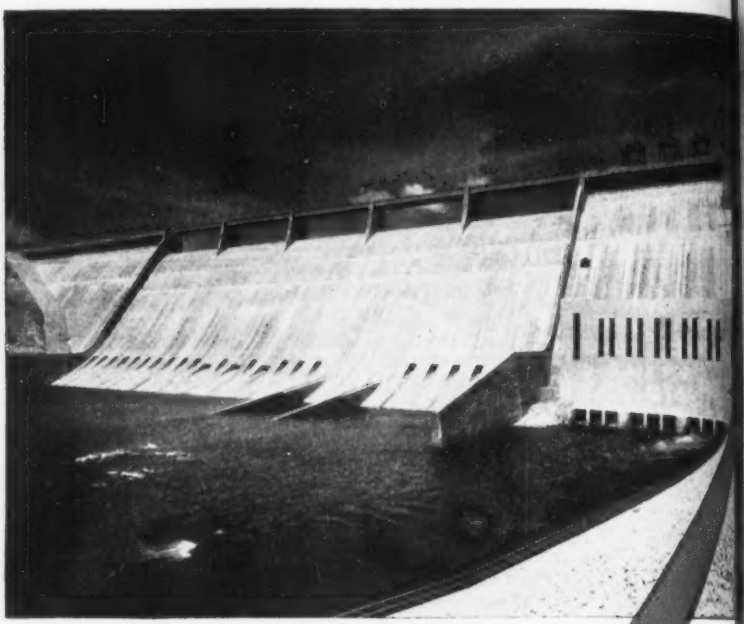

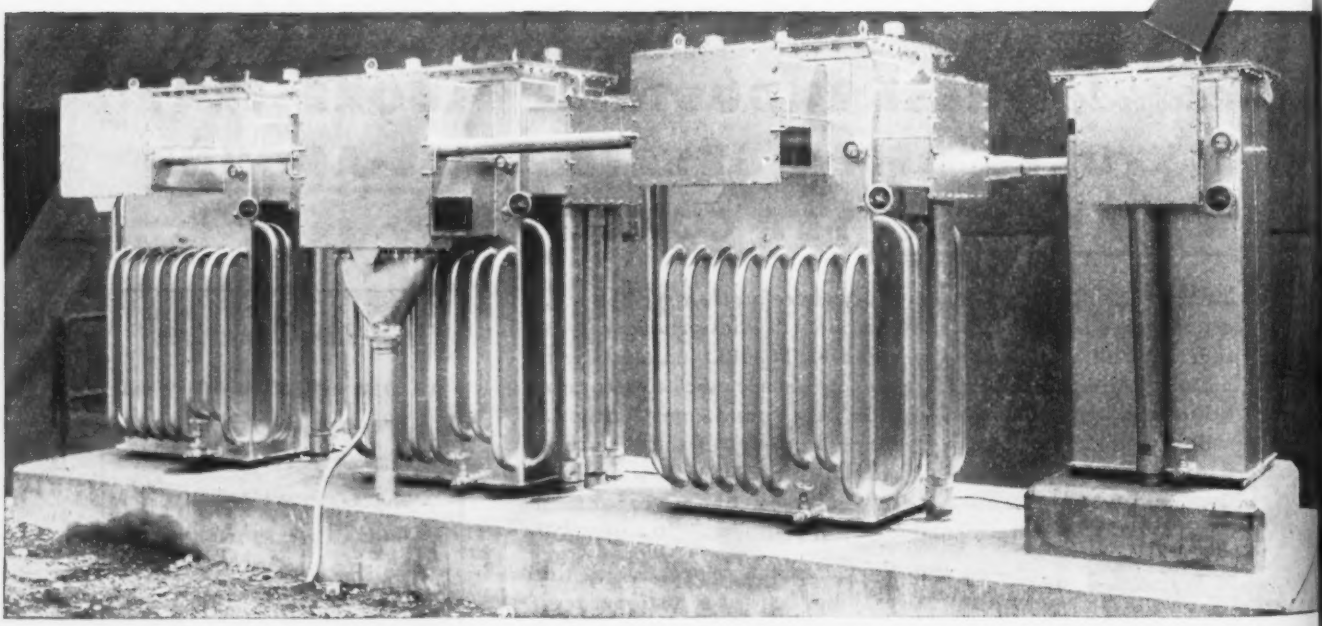

In addition to transformers the Kuhlman Electric Co. also manufactures Detroit Rocking Electric Furnaces—a load building, revenue producing product. Using electricity rather than fuel, these fast melting, efficient furnaces are speeding up the production of essential war needs in ferrous and non-ferrous foundries and casting shops.

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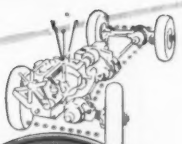

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FWDs embody the highest development of the true four-wheel-drive principle — pioneered and advanced by FWD since 1910 —four-wheel-drive with center differential for the utmost in controlled power, balanced weight and traction on all four "working" wheels. Write for the FWD Utility-Truck Bulletin.

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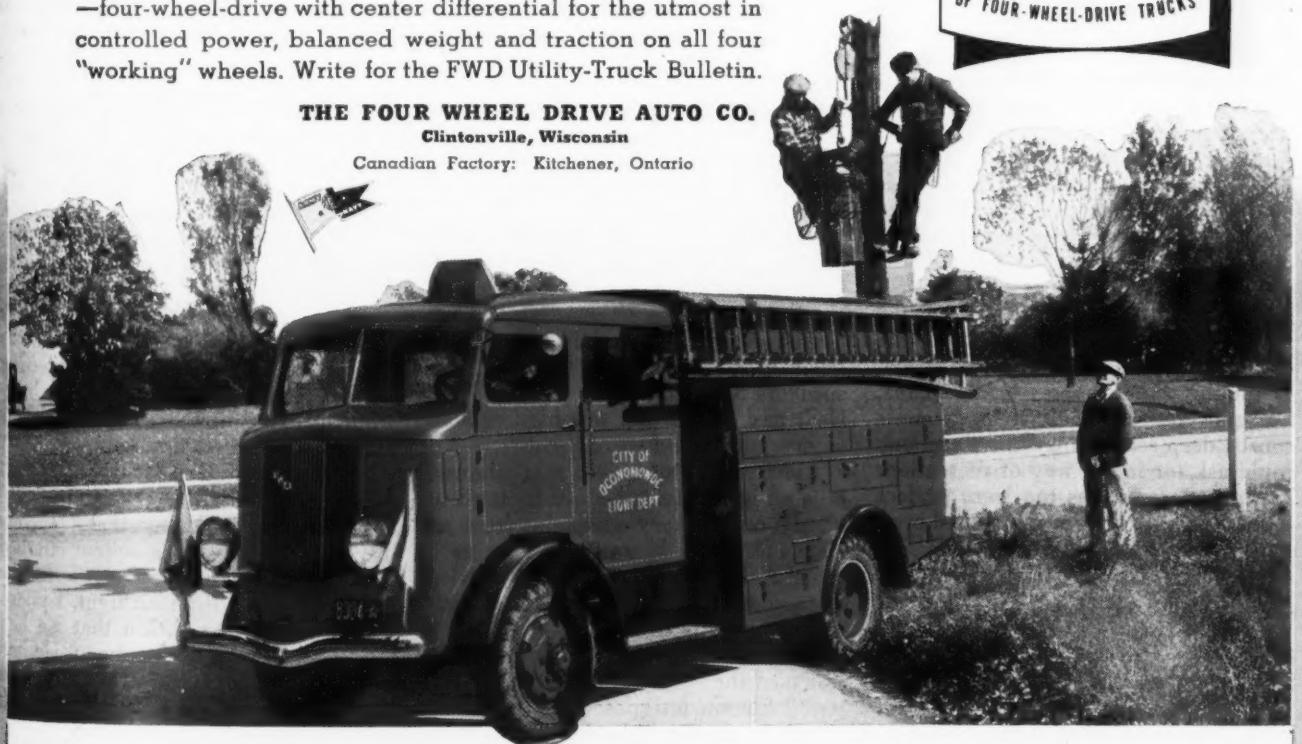

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ELECTRA'S HUSBAND

Super Convention — 194X

"WHAT did you have to eat at that dinner last night —crab Newburg?" Electra asked as I walked into the kitchen one morning recently after a night out. "You tossed and rolled as if you had a night horse in bed with you, and you laughed and talked like a crazy man."

"I was dreaming," I answered, "about going to a convention."

"That's silly," Electra said. "There's a war on and they aren't having any conventions."

"I know," I said, "but my dream convention wasn't ever held. It was the convention that should have been but never has happened. It was the convention that would end all conventions. In fact it was . . . "

"Say, let me smell your breath," Electra interrupted. "You talk as if you had a hangover. Did you lie to me when you said it was 12:30 when you came in last night?"

"No, but let me tell you about this convention," I answered. "You've been to enough meetings to appreciate this one. The place where it was held was simply ideal. It was a grand resort hotel located at a point where the mountains came right down to the ocean. There was a fine sandy beach, swimming pool, boats, bridle paths, two golf courses, trout streams, tennis courts, deep sea fishing—anything one could ask for in the way of recreation. The accommodations too were perfect —cottages, all kinds of rooms and even some tents for the hardy boys."

"There never was any such place," Electra said.

"I know it but there are a thousand convention chairmen who have wished for such a spot," I said, "and there will be thousands of others like them in the future. At this dream convention they had some system of straining out the playboys so that all of them were quartered in one wing of the hotel where they could make all of the noise they wanted. There was none of this being awakened at all hours of the night by a bunch of playful drunks.

"The system they had when you registered was perfect too. You just went up to the desk and gave your name and a pretty girl handed you an envelope with everything in it. She even gave you your room number and a boy was all ready to show you how to get there. They had a fine system for the fellows who didn't bring their wives. They had a little questionnaire which asked your preferences as regards blondes, brunettes and redheads, and darned if they didn't make good on the specifications you set. But a thing like that wouldn't interest me."

"It had better not if you want to keep your health and your looks," Electra admonished.

"Best of all about this fairy tale convention was the program," I continued. "It was a program chairman's dream. Sessions were only held in the morning and this left the afternoons free for recreation. Every session started promptly on time and kept exactly to schedule. And there was one hundred per cent attendance. That went for all of the big time executives who were there too. They showed up at every meeting.

"The speeches were perfect. Not one of them was read. There were none of those long, badly read essays which usually are ghost written by some lug who doesn't know anything about the subject. Every speaker got on his feet and really spoke—to the subject and to the point. It was wonderful. Then almost every presentation was dramatized in some fashion or other. If speakers had slides, they were big and clear and the curtain was high enough so everyone could see.

"There was one skit that showed how a big executive personally tried to handle an ordinary complaint from an irate customer. It was as funny as a crutch. He got everything all bawled up and had to have one of the girls get him out of trouble."

"You don't mean to tell me they ridiculed the bosses at this dream meeting?" Electra interposed.

"They surely did and there have been a lot of program chairmen who would have liked to do the same thing," I said. "The beauty of this program was that there wasn't any pap and none of the industry's sacred cows were brought out for a brief annual airing. And none of the subjects were old. The room where the meetings were held was really something. In the first place the chairs were comfortable and in the second it was air conditioned. You didn't stick to the chair seat and you didn't darned near pass out from the foul air. The meetings were held in rooms *really* well lighted too and the rooms could be made actually dark when they showed slides or movies."

"My, my, you certainly were dreaming," Electra mused.

"The entertainment was something to get excited over," I continued. "There were so many things for the wives to do that a fellow could get in a poker game and stay all afternoon and night and never be missed. And they had a lot of young fellows who didn't seem to mind a bit if they had to dance all evening long with a lot of wives . . . "

"Were you going to say like me?" Electra interrupted.

"Oh, no, dear, you're a fine dancer," I said quickly. "But it couldn't last—the dream, I mean. It finally became realistic when the banquet rolled around. That's the high-water mark of every convention and every chairman tries to outdo his predecessors."

"I know," Electra interjected.

"Well, everything about this dream had been so perfect," I said, "that I really began to look forward to the banquet. Instead of the usual gastronomical and oratorical flop. I expected something different. But it wasn't. There was the speakers' table decorated with a lot of stuffed and boiled shirts. And there was the usual menu —fruit cocktail, soup, fried chicken, peas, lettuce salad and ice cream.

"The entertainment had about the same amount of sparkle as the food. There was a wandering accordion player who was followed by a warbling soprano. Then the toastmaster introduced everybody at the speakers' table and several people in the audience. We were all ready then for an inspiring address and all that we got was a long-winded exposition of dreary details that didn't interest anybody.

"You were kind of let down, weren't you?" Electra said.

"No, I wouldn't say that," I commented. "There was a fellow climbed up on a chair off to one side of the room. He was a little bit tight, I guess. And I forgot to mention that we had hard French rolls on the menu. He had one in his hand—a sort of ossified dinosaur egg affair. And he had his arm all cocked to let fly."

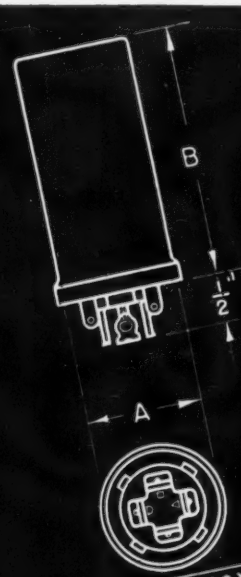
"Whom was he going to hit?" Electra asked.

"I don't know." I answered. "Just then you woke me up and spoiled everything."

MEMO TO Purchasing Dept.

For postwar, recommend we standardize on Solar's hermetically-sealed, patented special twist-prong base Type DY electrolytic. They're properly protected against moisture.

E.M.



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51 B50-2	DY-92	20+20	450	1"	3-3/8"
51 B50-3	DY-94	10+10	450	1"	2-½"
51 B50-4	DY-132	15+10+20	350-350-25	1"	2-½"
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Install in 1945 do not lubricate

Prelubricated ball bearings, now standard on Westinghouse CSP Motors up to 3 hp, require lubrication only after five years' or more service

Westinghouse Type CSP Motors, 3 hp and below, bought in 1945, will not require lubrication before 1950. Think of it! Five years of operation : : : 24 hours a day : : : with no attention whatever to lubrication. In 1950, inspect bearings. If greasing is needed—a simple disassembly job—and the motor is all set to run until 1955.

These prelubricated sealed ball bearings have been thoroughly field-tested in textile mills and in built-in machine tool installations. Early installations are still running on the original grease after seven years' service.

CSP motors may be mounted in any position, including the vertical. Wherever Class A insulation is applied, at least five years of operation without greasing may be expected. Applications in higher than normal ambient temperatures may require modified design.

For complete information, ask for DB-3100-CSP at your Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21326

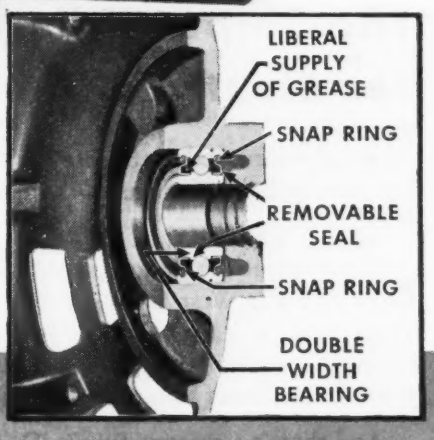
ONLY WESTINGHOUSE CSP MOTORS OFFER ALL THESE ADVANTAGES

- **PRELUBRICATED SEALED BALL BEARINGS reduce lubrication maintenance . . . assure longer grease life.**
- **IMPROVED TUFFERNELL INSULATION.**
- **DYNAMICALLY-BALANCED ROTOR.**
- **DIE-CAST ROTOR with oversize fan.**
- **LIBERAL THROUGH-VENTILATION—air enters front, leaves at drive-end of motor.**

before 1950!

This label appears on the end bracket of every CSP motor up to frame 225. It is your assurance of smooth operation, long bearing life, and low maintenance. It also means:

- No overgreasing.
- No grease seepage into windings.
- No unreplaced plugs.
- No costly lubricating schedules.
- No grease contamination.
- No "skipped" bearings while greasing.



HOW IT WORKS

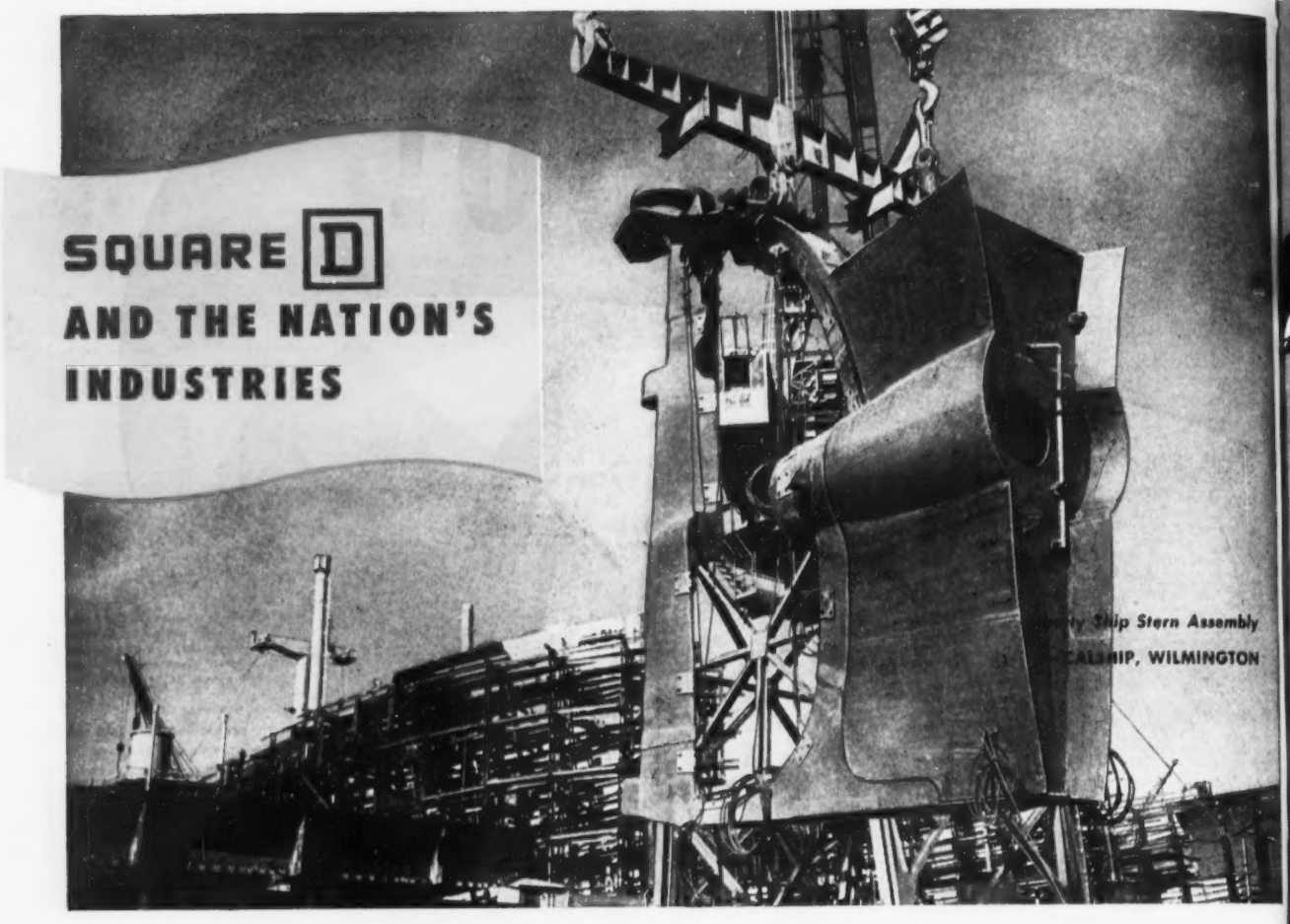
High-grade, long-life grease, specifically designed for these bearings, is packed into the bearing assembly by the bearing manufacturer. This original grease is good for at least five years of normal service. Double-width, single-row construction permits a more liberal grease supply and better sealing than the single-width design. Two seal discs, locked into the outer race by snap rings, fit closely over the inner race to form a revolving seal.

When motor is disassembled for other reasons, this construction keeps dirt out of bearings just as effectively as the cartridge bearings now in common use.

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

TYPE CSP MOTORS



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At the shipyards today's Square D's switch and panelboards stand as guardians in the harnessing of electrical power.

Throughout the nation, at shipyards on the East Coast and the West Coast—wherever veritable Niagaras of power are being bridled, private and government electrical engineers accept with confidence the installations of Square D equipment.

And there's a reason: Square D is the symbol for electrical control, perfectly applied. The name vouches for correct design, sound engineering, precise workmanship and trouble-free operation.

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Square D Saflex Switchboard

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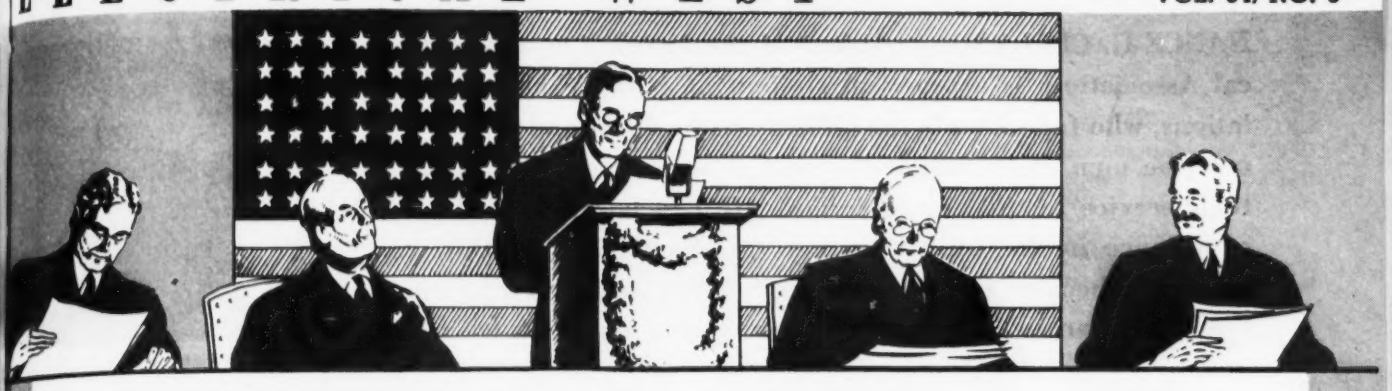
ELECTRICAL WEST

JUNE, 1945
VOL. 94, NO. 6



1945 CONVENTION-in-PRINT

Ladies and Gentlemen of the entire electrical industry —

THE thirteenth annual convention-in-print of the electrical industry will now come to order.

It is particularly appropriate this third year of war that we meet in print rather than in the flesh, for although paper is "critical," transportation and hotel accommodations are even more so at this gateway to our war against Japan. Every facility of that kind that we can refrain from using will be put to far more vital use in shortening and ending the war, which to us of the West has always seemed to be the most serious one and the toughest.

Yet despite the continuance of war in our theater of operations, it is highly important that there be a meeting of minds in this industry. We need it that we may be more intelligent in preparation for changes in our economy, our activities, our businesses and livelihoods which already are beginning to take place a month after VE day in Europe. We are in the transition from war back to peace right now. It is a transition that is distorted by many pressures: continued shortages in certain things, relaxations in others; the necessity to begin creation of wealth again to balance its total destruction which has been going on at such a tremendous rate; and the paramount necessity over everything else to prosecute the war against Japan more vigorously, more fiercely than anything before.

All branches, all individuals, all companies are faced with the need for a new adjustment to a new set of realities. It is to survey this change and to prepare for it that this convention is called. How best to meet, as we have met the challenges of war, the challenge of this transition, and to do so in such ways that all branches and individuals in the industry may best coordinate their efforts, is the subject before this assemblage.

Our convention theme is realistic. There has been too much talk about the wonderful opportunities of the postwar era without the balancing consideration of the responsibilities and obligations. Let us therefore discuss in this convention-in-print the whole subject—*The Responsibilities, Obligations and Opportunities of the Postwar Era.*

Our program delves into this proposition from many points of view and of self interest. The presidents of two Western industry associations present it in their annual reports to their memberships. Many leaders of the industry comment on the subject, bringing to it their considered opinions.

In engineering, the horizons opened by war-accelerated developments will be explored and the obligations and opportunities for extending rural electrification appraised. In the realm of sales, the necessity to train an entire new field army of sales people, and the new competition of the cooperatives will be discussed. Construction is spoken of as the catch-all of unemployment, but its ability to take it must be probed.

Such will be the convention agenda.

HANCE H. CLELAND, president of the Pacific Coast Electrical Association, is a practical student of postwar human relations, who feels keenly the obligations business and industry owe the men and women who will return to civil life after their service in the armed forces. He is a lawyer with long experience in the utility business in the Pacific Northwest before he became president of the San Diego Gas & Electric Co. In his presidential address he makes a stirring plea for

RECOGNITION FOR A GOOD JOB

THROUGHOUT this war American manufacturers of almost every war product, from giant ships to the smallest rivet—and their employees, received from the government richly deserved "E" pennants which were flown from their plants and offices with justifiable pride.

From the management and employees of perhaps the greatest industry in that same nation—those who generate, transmit and distribute electricity—this incentive and recognition were withheld. It is not my purpose to discuss "Why?" this denial, but rather to review briefly some of the accomplishments of that great industry, in the face of most unprecedented demands for service; most drastic restrictions, curtailments and regulations.

Irrespective of the fact that our benevolent government, for reasons of its own, denied such "E" awards to our industry, (and that could be an interesting story of its own), the commandants of two naval districts granted special citations for meritorious wartime service to the electric utilities serving their districts, namely: Florida Power & Light Co. and San Diego Gas & Electric Co.

Every manufacturer and business and branch of the military service was dependent upon an adequate supply of electric energy. Without it the war effort would have collapsed. The plants, camps, hospitals and other installations would have closed. Yet our industry met every demand—and did it without "government money."

A recent report from the Federal Power Commission covering the six-year period ending Dec. 31, 1943 shows, that kilowatt-hour sales increased 75%, generating capacity 22%, number of customers 15% and electric revenues 38%. These very large increases were accomplished by an increase of only 7% in plant investment. These are national figures for the industry as a whole. We know that on the Pacific Coast these increases were greatly exceeded.

Our product is the only basic necessity which called for no OPA ceiling. Ours is the only product or commodity whose cost has actually been reduced during wartime—while the cost of practically every other commodity has gone up. This was accomplished in the face of materially increased operating costs, reduced personnel, staggering taxes and other burdens.

Why were we able to do this?

To us the answers are simple. It was because the whole training and experience of management and employees within our industry is and had been dedicated to the theory that come hell, high water, or Hitler, the lights must be kept burning and the motors turning. The Army, Navy, industry and the home folks had confidence in our ability to do it—they just naturally expected it of us and we couldn't let them down.

The pay-off comes in the inner satisfaction that we *didn't* let them down and that we *did* do our part in meeting every emergency and in helping materially to win the war.

Perhaps the best evidences we have of this are the statements of those men high in responsibility for the successful conduct of the war—Army, Navy, Marines—production, construction and fighting men. Typical of their comments were the following:

"The end product of the utility industry is service. . . . You have served best, perhaps, when the least attention is called to your services—when they are supplied in such an unfailing way that they are taken as a matter of course."

"This is a tribute to free American enterprise, accepting a responsibility and putting forth maximum effort to assist its government in an unusual situation."

"Due to your own foresight and ingenuity, we have never found the electrical circuits empty, there has always been current available when we called for it."

"You men and the companies you represent have been in the front lines of this second army, helping to fight a battle of production such as the world has never seen. . . . But you get no Croix de Guerre, you get no medals, for keeping your utilities in constant and smooth operation. . . . No industry has been more cooperative than the light and power companies in their efforts to serve the nation's war industries and military installations."

"It is to the lasting credit of the utility industry that it has had the vision, the desire to cooperate, and the training in rendering service, no matter what the obstacles. . . . We know of no industry that has been more cooperative than the power suppliers in their efforts to serve the nation's war industries and military installations. . . . Gentlemen you are to be congratulated."

The finest summary of all these splendid statements is that of Rear Admiral W. R. Monroe, USN, when presenting the citation to the management and employees of Florida Power & Light Co., he said:

"You delivered, each and every one of you—from executives in the front office to the men who climb the poles. When we called for power we got power and not—thank God— *alibis*."

These words of praise came about as a result of the extraordinary efforts put forth by management and personnel, e.g.:

Providing service under conditions that in ordinary times seemed impractical both from the standpoint of time and load conditions.

The foresight displayed by management in making possible the taking on of loads during the war period—in some cases as much as 100% increase in four years.

Coordination of utility service between branches of government and between various units of each branch.

Loading of equipment beyond what had previously been considered good practice.

Return to continuous operation of older and less efficient plants and equipment that had been retained as emergency stand-by.

Standardization of apparatus and equipment.

Emergency extensions of "power pools."

Greater cooperation between utilities and government agencies in power interchange.

Accelerated development of means of control for integrated operation of systems.

Pooling of equipment and material.

Substitutions of plentiful for scarce materials, often requiring major changes in design and in operating practices.

Utilization of surplus stocks in the other fellow's hands.

Cooperation in protective measures and in the conservation of fuels, rubber and manpower.

Protection of property and cooperation with civilian defense.

Providing engineering skills to the armed forces without stint.

Cooperation in conversion of industry from peace to war production.

Modification of maintenance schedules to allow longer periods of operation.

Extensive salvaging of materials and reconstruction of apparatus from damaged and out-of-date parts.

Cooperation in nutrition education, bond drives, recruiting and operations affecting dimout.

Studies and investigations of insulation deterioration by which shorter life of cables, transformers, and other apparatus was traded for heavier loadings during the war period.

Narrowing of reserve margins.

Contribution of personnel to the armed forces.

Leadership in maintenance and repair of customer-owned appliances and equipment.

The slogan of the Seabees can well be applied to the electric utilities, namely: "Can Do."

Within our own association, during the past twelve months we have highlighted two major programs, namely: (1) The publication and distribution of a 60-page booklet concerning the employment and re-employment of returning servicemen and women and (2) a proposal within our membership urging immediate and serious consideration of those younger men, within our respective company organizations, who are the reserve from which future executives will be drawn.

The booklet entitled *You and Joe and his job*, was largely prepared by the writer, its publication was financed by the association, it was sent without charge to the presidents of approximately 4,000 of the nation's largest employers and additional copies were sold in sufficient quantity to pay practically its entire cost. The booklet was not prepared for the use of service men. It was intended solely for employers—

written by management for management.

Many favorable comments were received concerning it. It served as an inspiration to other associations and industries to prepare and distribute similar publications. We believe it accomplished its purposes—namely, that of giving to management generally a clearer concept of its moral and legal obligations to employees in the military service and methods of meeting and solving the problems of the returning veteran.

In February of this year the membership of our association was furnished with "a plan and proposal with respect to future executives." This plan stated a problem and outlined a method of solving it, namely: (a) That one of the most serious problems of management is to carry its best young men through that period where they are likely to feel that there is nothing ahead for them within the company organization and (b) that one of the means of correcting such misapprehension is to encourage the active participation of the younger men, in the work of the association.

Everyone of us has had the experience of seeing a junior employee of exceptional ability progress rapidly beyond his less capable fellow workers—and be gratified that he is getting ahead. Eventually, however, he reaches a point beyond which his progress is necessarily slower, regardless of ability. At this point one of two things usually happens—he becomes dissatisfied and leaves—whereupon the company loses not only an able man but its entire investment in his training; or he becomes "resigned to his fate", stagnates and by the time advancement is open, he is no longer qualified for it—his ambition and his zeal have died.

To meet this it was proposed that management should make a careful study of its younger personnel, select those regarded as potential executive material and see to it that they are encouraged to take an active part in association work—the preparation of papers, attending sectional conferences and meetings and in general participating in activities which will broaden their outlook. With such interest on the part of management, we need not fear they will know, without our specifically saying so, that we have better things in mind for them. There is a further advantage to us—if a young man does a good job or a poor job on association assignments, he will most likely do the same when the going is tough in his work within his company.

Many of us will be retiring one of these days. Our immediate successors are probably pretty well recognized. I am not addressing them. It is the third and fourth "string" boys down the line, who must have our encouragement.

We know this program has met with favor and that it will be productive of "dividends" if seriously considered and acted upon.

It is my belief the future of the electric industry here on the Pacific Coast is assured. We have witnessed the wartime shifts of power-consuming industry and industrial populations to this coast. Much of that industry and the great majority of that population will remain when war contracts are terminated. Those industries are seriously planning conversion to peacetime products. New industries are moving to the Coast—opening branch plants and distribution headquarters. For the first time the West Coast has an adequate pool of skilled labor. Those folks want to stay here. It seems to be the unanimous opinion of nationally known economists that the trend of industry and population is westward—that it will continue in even greater volume in peacetime. The tourist trade which supports many local businesses, will, after the tire and gas restrictions are removed, exceed our fondest dreams—and it will continue. True, there will be some reduction in our revenues when major war contracts are cancelled, but by 1950 we will have regained our temporary losses and will continue our normal upward trend.

Indications to date are that the national administration leans more to the encouragement of private industry and toward a more considerate treatment of our particular industry than has been the case for the past twelve years. This will restore the confidence of investors and operators. It will encourage expansion.

J. A. HALE, who is serving his second term as president of the Northwest Electric Light & Power Association, is a civil engineer who entered the power business via the construction field, first with the USBR and later with the Phoenix Construction Co., which built several plants in Utah and Idaho. He is vice-president of the Utah Power & Light Co. A keen student of electrical development and a realistic commentator on trends, he contends in his presidential address that

IT IS TIME TO TEST OUR PLANS

GERMANY has fallen, defeated, crushed and despised. Japan is about to feel the undivided might of allied military and industrial power. United Nations representatives at San Francisco seek a basis for lasting peace. The United States finds itself under the leadership of a new president.

It is yet too early fully to appraise the effect of these world-shaking military and political events but certain trends, particularly as they affect the electrical industry, are beginning to become apparent.

Peaks of war production probably have been reached and we undoubtedly can look forward to cutbacks and reconversions before many months that will result in an increase in the manufacture of civilian goods.

Thus, we are on the very brink, perhaps over, of that transition period which has been the subject of so much discussion during the past year or so. We now can put our postwar plans to the test and we will readjust this planning with greater accuracy of timing, as conditions affecting our future operations unfold to permit a clearer view into what will be our tomorrow.

The past year, in retrospect, illustrates the pitfalls of timing our planning during war. A year ago many in our industry felt that we were approaching a time when we might soon expect to promote the expansion of civilian use of electric service. Our association sponsored a series of meetings with electrical dealers, contractors, manufacturers, distributors and utility people at which the necessity for getting ready for the eventual resumption of electrical appliance business was stressed.

The idea was fine; the program was timely and the meetings were constructive. However, we seem now to be as far from a resumption of the appliance business as we then seemed to be. Even so, the seeds planted at those meetings eventually will bear fruit for the benefit of the entire electrical industry in the Northwest. As one direct benefit of these sessions, the association acquired dealer and contractor members so that, when the green light is given, we can present a more solidly united front in the promotion of appliance sales in competition with other industries.

Recent meetings of the sections of the association have indicated sound progress in the thinking and planning in their respective fields. Engineers and operating men, reporting at a meeting last March, showed a firm grasp of the problems they will be called upon to meet during the transition period and after in rural line construction, rebuilding and revamping of plant to accommodate shifting loads and long-range load growth, not to mention improvement of operating procedures for economy and efficiency.

The sales group found much to discuss in the line of what business opportunities lie ahead, which opportunities would be opened first, and how best to take advantage of them. A particularly interesting part of the program of this meeting was a "Parade of Manufacturers and Distributors," in which representatives of these groups presented their plans for future manufacture and distribution of appliances, and their thinking with respect to meeting the postwar competition for the consumer dollar. Many plans were told publicly for the first time and many good ideas for promotion of the electrical business were brought out.

The new personnel conference presented surveys giving much information on procedures and practices among member utility companies on all manner of problems pertaining to employee relationships to the company. These reports brought out strengths and weaknesses that are proving of great value to companies in their planning for the employment of returning veterans, and for the creation of company organizations that will be called upon to meet a new set of operating and business development problems after the war.

The accounting group is presently planning its meeting for next month, and here again, it is fully expected that the planning and thinking done in the accounting and customer service field during the past year or so will crystalize in more definite form for meeting the problems of the transition period and thereafter.

Promotion of industrial development in the communities our electric utilities serve is a new activity undertaken this year by our association. Many companies have established industrial development departments, and companies serving the State of Washington have undertaken an advertising campaign directed toward attracting industries to that state. Realizing there is much to be gained from an exchange of views among member companies, as well as from joint research, an industrial development committee has been set up. One of the first objectives of this committee will be to survey what has been done in the past by the several companies to be used as a guide to future activities.

This committee recognizes that the sale of power is not the ultimate objective in industrial developments but is only the means to the end. The objective is full employment under free enterprise and initiative, which, in the philosophy of our industry, is the key to prosperity and success of our American way of life.

We should grasp this challenge to our industry with zeal for there is no private business enterprise with a

greater interest in industrial growth, nor one better equipped to help guide this growth into channels profitable and beneficial to our communities.

Another new activity of the association, now in the process of completion, has to do with rural and farm electrification. Inspired by the outstanding record of private electrification of rural areas in the Pacific Northwest in the past, it has been decided to tell this story to the public through the medium of an attractive booklet, pointing to future plans in this field by the several companies in their respective service areas, all of which are developing these plans under liberalized rural extension policies. It was felt this story should be made known to the public by a widespread distribution of this booklet by each company. It is expected that the facts and prospects in this field will be made better known, and that a better understanding of rural electrification will be gained by the layman.

A year ago in an article in these columns, I referred to the then prospective vote on Referendum 25 in the State of Washington. This measure, designed to extend the PUD principle to wider areas and authorize super PUDs with extensive powers uncontrolled by a vote of the people, was presented by proponents as the great test of public opinion on the broad issue of public power. This measure failed to pass at the November election by the substantial majority of 68,766 votes, a ratio of five to four against. Surely it can be assumed from this vote that a majority of the people in that state are opposed to an extension of public operation under political management.

Now a new issue has been raised in Congress in the proposal to form a Columbia Valley Authority and a Missouri Valley Authority, both along the lines of the TVA. Many groups of our citizens in all walks of like are studying this proposal and many have already opposed it on one or more of several grounds. Our industry can be of great help to these groups in furnishing them accurate information about the implications and costs involved in this proposal. It is unlikely that Congress will pass the proposal without sounding the wishes of the people most affected. Here then is a new challenge to us that we get the facts and implications inherent in this proposal to the man in the street.

In times such as these we are passing through the activities of our association have been necessarily curtailed. Our major concern was and is the winning of the war. Nevertheless, we believe the association has been held together so that it can begin to function on a broad coordinated basis as soon as developments permit.

As we look hopefully into the future, let us remember that we still have a tough and costly war ahead of us in the Pacific; that the paramount issue with us all is a vigorous prosecution of that war; and that from that viewpoint and with that objective, we bend our efforts toward solving the problems of the transition period lying in the fairly near foreground with a view to winning peace and prosperity under American principles of freedom in the long-range future.

RADIOTELEPHONE TO BETTER STREET RAILWAY SERVICE

DESIRE to better service to the public and to curry good will that will result in greater patronage pervades management of the street railway business, as well as the electric power industry. Typical of private management's acceptance of its responsibilities to the public is this installation of the most modern two-way FM dispatching system by National Transit Lines, new owners of the Los Angeles Railway system. The equipment supplied by General Electric Co., consists of a 250-watt transmitter located on the company's downtown office building, and twenty-two, 30-watt, two-way mobile transmitters and receivers installed in automobiles and service trucks. Direct contact is afforded between supervisors and dispatchers and also intercommunication between any of the twenty-two mobile sets. With an effective coverage of 35 miles, the new system supplements ordinary telephone in emergency cases such as accidents, breakdowns and delays by traffic jams.

V-J Day is not so far away but what an appraisal of the industry's postwar outlook is in order. So that all branches of the electrical business might benefit from the thinking of the chief executives of electric utilities as regards the era that lies ahead, the editors asked for some realistic comments and opinions. In the following symposium, a group of leaders look at future problems and possibilities for the electrical business in the Far West and then comment on

OBLIGATIONS AND OPPORTUNITIES

J. B. BLACK
President, Pacific Gas and Electric Co.

THERE is good reason to believe that in spite of the dislocations of the transitional postwar period, active and profitable business will be available to the electrical industries. The San Francisco Bay area has had the greatest population increase of any congested production area in the nation—583,000 new residents since 1940. Much of this new population will remain here and, augmented by returning service men and their families, will make permanent many of the gains already made.

Industrial activity has been increased in terms of product output approximately 175% since the prewar period. Although there will be considerable postwar recession, especially in shipbuilding and related industries, many of the added manufacturing activities will be continued after declaration of peace.

Eastern manufacturers are being attracted to this area by the expanded local market and the prospect of increased foreign demand upon the West Coast. Plans have already been made for the establishment here of branch plants for the production of commodities ordinarily familiar to consumers in every part of the world; and opportunities for new enterprises in all lines are thoroughly recognized.

Our increased population and industrial growth will provide a real demand for electrical appliances. Studies we have made indicate a potential market through the year 1950 for $285,000,000 worth of the 14 major domestic electrical appliances. The same retail prices in effect in 1941 were used in arriving at this enormous estimate of accumulated business awaiting the resumption of the manufacture of civilian goods.

Pacific Gas and Electric Co., which in the past five years has spent $165,000,000 in plant facilities to meet the war demand for service, is ready to invest whatever amount is needed to meet postwar requirements. The company historically has extended its rural service as rapidly as possible. The result is that today California leads the nation in rural electrification. Although we now serve 95% of all rural business within one-quarter mile of our lines, we are taking steps to deliver electricity to several thousand unserved rural residents on the fringes of our distribution system. We are planning extensions on a liberalized basis which will bring about virtually 100% distribution of electricity to both the urban and rural areas of central and northern California.

This favorable outlook, of course, is not without certain obstacles, chief among which might be the encroachments of government in the field of private enterprise. It is our hope and expectation that present and anticipated federal activities, as they affect our industry, can be worked out cooperatively and correlated into a general plan for the good of all the people and our industry as well. An example of this policy is the contract with the government under which we are purchasing and distributing the electric output of the Shasta Dam power installation, an arrangement which saves the tax-paying public a large additional investment in the Central Valley project for transmission and stand-by facilities.

The future opportunities for the electrical industry in the West appear very bright and its obligations are equally well defined: It must at all times be prepared to meet the service requirements of its customers and to anticipate the needs of a constantly growing territory.

FRANK McLAUGHLIN
President, Puget Sound Power & Light Co.

THE electrical industry's postwar obligation to the public, the customer, the employee and the investor alike is first, last and always to do those things which are necessary to foster and preserve free enterprise in the power field. By those of private power this statement will be termed trite. Those who are for public power will call it bunk.

Nevertheless, it would seem that the incentive and initiative of free enterprise in all phases of the electric industry must be the motivating force if electricity is to bring the maximum of benefits and blessings to our people.

Today the existence of free enterprise in the power field is being menaced, not because of its inefficiency or incompetence, but due to the subsidized and unregulated competition of public power. Free enterprise in electric power has justified its place on two major economic grounds. First, it has achieved substantial savings growing out of the operating of large, diversified and integrated systems. Second, through continuous improvement of methods, it has heightened operating efficiency and reduced costs. All this has resulted in a substantial lowering of rates, better service and new and greatly expanded uses for electricity.

The capacity of private power to live up to its obligations can only be assured if there is first, tax and regulatory equality for all in the electric business. Second, by the electrical industry so conducting itself and doing such an outstanding job that it will de-

serve and receive the confidence and enthusiastic support of its customers and the public at large. The accomplishment of these two objectives calls for the highest type of statesmanship in government, business and labor.

W. C. MULLENDORE

President, Southern California Edison Co.

POSTWAR opportunities—and obligations—of the electrical industry here in the West are of the same general character that have prevailed since our industry began. They have been multiplied and extended, of course, by many modern factors, but basically they are not strange or unusual.

Everybody's business is of interest to us in our forward planning. The problems that confront our customers—be it water for the irrigation of crops or the size of a globe for the baby's bedroom lamp—are our problems. Obviously, we progress as our customers progress.

The electric utilities do not have as great a problem, physically, in reconversion to peacetime operations as do many of their customers. But the *effects* of reconversion are as important to the electric utilities as to those who purchase their service.

The present attempts to plot a postwar course for business here in the West are closely akin to the task of navigating a swiftly moving river at flood stage. Devious currents, uncharted obstructions and floating hazards conspire to confuse the pilot.

Studies which have been made by the commercial department of some electric utilities, and other businesses, indicate a rapid conversion to peacetime operation by many established industries. It is certain, however, that all will not be able to attain their goals of immediate conversion—not so much because of physical obstacles as because of uncertainties as to costs, markets and the value of money. These are among the currents, obstructions and hazards which confront the business pilot.

The problems of marketing alone—problems first of determining what constitutes a market, of potential competition, of organizing and training sales forces, of advertising, are not to be regarded as incidental in any program of conversion. Enthusiasm for a new product certainly will not of itself assure that it can be traded for the dollars of the public.

There is no question, though, that war conditions have created opportunities as well as problems for business in this region. We have experienced a tremendous population growth as a result of war-created demands for manpower, and much of that growth will be retained.

Increasing numbers of industries have for the first time experienced the natural advantages available to industrial operations in this area. Substantial numbers of these industries will *want* to continue here, postwar.

The electric companies can help other business chart a reasonably safe course for postwar steering. Our well trained engineering staffs and our commercial experts welcome the opportunity to carry on in the tradition of the utilities, the tradition of helpfulness to every class of customer, and in so doing, we will meet the obligations resulting from our past leadership.

JAMES H. POLHEMUS

President, Portland General Electric Co.

HERE in the Pacific Northwest where kilowatt-hours are abundant, the manufacturer, distributor, dealer and utility have the joint obligation of providing the appliances and the low-cost kilowatt-hours to bring the cleanliness, comfort and convenience of complete electrification to the northwest factories, farms and homes. The utilities have a splendid opportunity to prove their initiative and enterprise by finding ways and means to deliver electric energy to apparatus and appliances of the customer's choosing at costs comparable with other light, heat and power sources. The development and expansion of fluorescent lighting and electric space heating offer good examples of the challenge and, at the same time, the opportunity the progressive utility faces in the postwar period.

HARRY J. BAUER

Chairman of the Board, Southern California Edison Co.

ALL electric companies of this region have experienced "forced draft" operating conditions since the beginning of war-created demands for more and more power for industry—and the attendant increased requirements of home and farm customers for electricity. The ability of the utilities to carry these loads has been up to the standard of "E" for excellence. Utility workers of the West can be proud of their war record.

Out of this wartime service have come new techniques of construction and operation, and new views of how electrical service can contribute, to an even greater extent than in the past, to the solid economic progress of Western communities.

We have learned, too, through the highly successful operation of power interchange between companies of the West, new practices of cooperative effort and economy for the benefit of customers.

All of the electric utilities will program extensive maintenance work as an after-the-war "must." Much maintenance has been deferred to free manpower for other tasks that could not wait and to free war materials needed on the fighting fronts. The resumption of maintenance which has been thus delayed will have a dual beneficial effect. It will, first, enable the reem-

Black Mullendore Polhemus McLaughlin Bauer

Wishon Gadsby Tracy Strike Morris

ployment of many men who have been on military leave with the armed forces and it will permit of the use of our new techniques and practices to build even more adequately than before.

The West is still a land of opportunity and I readily can see the viewpoint of those wartime newcomers and strangers among us who will choose to make the West their home—*if* in the West they can be given the opportunity to earn a livelihood. And I think the West can do this.

The Southern California Edison Co., in the program it has planned for the immediate future and for the years ahead—of which the present construction of its third Boulder Dam transmission line to the southern California metropolitan area is one important phase—expresses its confidence in the future of the West.

SAMUEL B. MORRIS

General Manager and Chief Engineer, Los Angeles Dept. of Water and Power

THE Los Angeles area represents a great potential market for peacetime production and distribution of many products. This section, fortunately, will have a plentiful supply of fine American workers skilled in all fields, as well as a large number of capable industrialists as evidenced by the tremendous expansion of manufacturing facilities in this area.

The department's confidence in the future of this area is shown by a postwar expenditure for betterments and additions to the electrical system representing over $100,000,000 for the seven-year period following the war. The department contemplates a program for the promotion of the widespread use of electrical energy in the residential, commercial, and industrial fields; and the resulting encouragement to industry will provide jobs for many of the war workers who have recently come into this territory.

This development of "the electric way" will help to raise the standards of home life to a higher level than that heretofore known.

C. J. STRIKE

President, Idaho Power Co.

TODAY we are witnessing the closing period of a second World War, and people everywhere are discussing the reconversion back to a peacetime basis. The experience of a war economy definitely proves that prosperity is the result of abundant production and the exchange of goods and services which follows. In other words, war production has brought national income to a level over twice the income we ever sustained in a peacetime year. The past four years also prove what American ingenuity, know-how and determination can accomplish when we lay aside our petty controversies and unite all segments of our people (capital, labor and government) in a program for the accomplishment of a common objective.

The problems of the future can be summarized by our ability as a nation to find a program of peace production to take the place of war production, for only by such accomplishment can we expect to develop a national income adequate to support our people, to meet the cost of necessary government and to start the orderly liquidation of indebtedness.

The electric light and power industry has been in the political spotlight for the past two decades largely because we allowed our business to grow away from a common understanding with the public. Our contribution to war production and to the successful prosecution of the war compares most favorably with any and all industries, and I believe we enjoy better public acceptance today as a result.

Our first postwar obligation is to provide leadership in a program of research and industrial development to sustain a high national income. It is at the same time an opportunity to further our public acceptance.

The electric light and power industry obtains approximately 3% of the national income, and the reliability and adequacy of electric service are more important than its cost. We are unfortunate in being measured by a governmental yardstick which does not include comparable taxation and which embodies the benefits of government credit on the cost of money, elements which combined represent approximately 50% of our total income. In other words, if we enjoyed such subsidies, electric rates could be reduced 50% in the case of our company.

It is our opinion that if we do an outstanding job on the controllable costs in our business, and make our proportionate contribution to the general welfare program, the public will not choose to socialize our industry—for in the final analysis, either America will go forward under a democratic system with tax-paying private industry and business or we will move into some form of socialism or totalitarianism. Certainly it cannot be a halfway program, for we found nearly a century ago the nation could not go forward half free and half slave.

A. EMORY WISHON

Vice-president and General Manager, Pacific Gas and Electric Co.

RETURNING war-veteran employees of Pacific Gas and Electric Co., more than 2,700 in number, will find jobs awaiting them, thanks to planning which this company started immediately after the United States entered the war. Two major policies have paved the way for the prompt reinstatement of our men from the armed forces with a minimum of displacement of other employees.

Since 1937, the company has maintained a pension plan under which

Klauber Merrill Merwin West

employees retiring at the age limit of 65 are assured an income thereafter based upon length of service. Since the needs of war began depleting our personnel, those of our employees reaching retirement age and still physically able to continue their work have been retained in service. Their jobs constitute a substantial backlog of employment available to returning war veterans. The older men, having earned retirement by their long service, will be replaced as required by circumstances, but being assured of pension income will not then be added to the postwar employment rolls.

The second part of our program provided for the deferment of maintenance and construction work, where possible, with two definite purposes —first, to conserve critical material and labor and, second, to accumulate a work pile which in the postwar period would create jobs for our men as they are released from military service.

Thus, largely through these far-reaching policies, we plan to reinstate in their old jobs or comparable work every one of our employees in the armed forces, with the least possible disturbance of employment conditions during the postwar era. General application of similar policies will go far in preventing the adoption nationally of drastic methods to alleviate unemployment after the war. We want no leaf raking this time and there need be none.

Z. E. MERRILL

President, Mountain States Power Co.

WE of this industry look beyond the war to peace and toward the future with plans for building a better service. We accept the challenge as our obligation and opportunity. Our first consideration is the obligation to our people returning from the armed services. This will mean much more than furnishing them with mere jobs. It is our responsibility to see that these people are so far as possible fitted into a position to their liking.

With a large backlog of postwar business in sight, the immediate ten-year postwar era promises a greater expansion in our business than has probably ever occurred in a like period of time in our history. The desires and needs of industrial, commercial and residential customers will be such as to tax our ability to keep pace with our service requirements. We are prepared to meet these needs. We shall strive to furnish greater values of electric service at lower costs in the future as we have in the past.

L. M. KLAUBER

Vice-President and General Manager, San Diego Gas & Electric Co.

FOR the first time the electric industry will have a receptive audience if it endeavors to make clear the unfair character of governmental competition, and how synthetic and flexible is this so-called yardstick comparison. As long as ours was the only industry suffering from this governmental threat, it was almost impossible either to inform or interest the public in the true nature of the competition and its corroding influence on the business affected. For our industry is so hedged about with technological intricacies, and the power projects so complicated and obscured by accessory programs, such as those of water supply, flood control, and navigation, that it has been impossible to secure any public understanding of how government competition works.

But, with the end of the war, the situation will be different. For now the government is a large owner of factories of all kinds and of housing projects; and if those who favor this insidious socialization have their way, many businesses not having the complications which becloud the utility industry will be affected by tax-free government competition. Every factory owner having to meet the prices of a government plant subject to no fixed charges, every landlord with a house to rent near a war-built housing project, and every corner grocer in competition with a tax-free cooperative will at last understand where government ownership must inevitably end. They will learn by experience how it feels to pay taxes which are used in part to subsidize a tax-free competitor. They will see that the removal of government-owned property from the tax rolls does not reduce taxes; it only transfers the burden to other shoulders. They will discover, to their dismay, the further hidden subsidy in governmental securities which are income-tax free. They will learn that their government-owned competitor gets free engineering, legal, and printing services from other government departments, the franking privilege of the mails, and a release from the restrictions of local laws, ordinances, rules, and regulations which make both construction and operation more expensive for the private operator. Every privately owned project thus threatened by a competition so unfair will, for the first time, see the character of this competition clearly, and will realize at last that, unless all types of business stand together, the days of private enterprise are nearing their end. The business man who sees no danger in these processes until his own particular industry is threatened will discover too late that the bell has tolled for him.

A. B. WEST

President, California Electric Power Co.

IN the postwar period it will be incumbent upon the electrical industry to assist in the development of a peacetime economy that will help to interpret to the people new standards of living for which they should strive and hope.

There will be an opportunity again to demonstrate that our system of free enterprise, which has made possible the full realization of the nation's resources in the war effort, will be equally effective in continuing to develop our fullest possibilities in industry, business and all of the arts of peace.

In meeting our responsibilities adequately, it will be important that we

shall not only welcome our own soldier heroes back into our organizations, beyond any legal requirements involved, but also that we shall assist them and all other returning service men and women to apply the arts and skills they have acquired in the war service to the best advantage of our American way of life.

FRANK TRACY

President, Sierra Pacific Power Co.

THE electrical industry has accomplished a miracle during these years of war in the face of labor and material shortages and wartime restrictions. Its product has never been too little or too late.

It appears that the postwar opportunities for continued production will be great. Organizations have already well laid plans to take care of a tremendous demand for household appliances and conveniences both in added installations as well as replacement of obsolete and worn-out equipment. Furthermore, organizations have been giving considerable thought to other postwar problems such as jobs for returning veterans, finding new industrial loads to replace sales to war industries and many problems having to do with load building.

In all this postwar planning, however, the industry must not lose sight of the fact that it has a real obligation to its customers for "service." Utilities must have definite postwar plans for the rehabilitation of their systems for the betterment of service to their customers. Among other things, they must make sure that their distribution systems can handle the new loads which are to develop. Disruptions to service must be reduced to a minimum. Production and distribution efficiencies must be improved as a means of lowering the cost of power to consumers. Wherever possible, service must be made available to outlying communities.

Consumers accept a wartime service fully aware of the difficulties which face the industry. They will however, expect improved service after the war. "Service" is, therefore, an important obligation of the industry to its customers in the postwar era.

GEORGE M. GADSBY

President, Utah Power & Light Co.

AS the war has progressed we have become inured to the use of superlatives. America has assembled and transported the greatest army in history; it has built the greatest navy the world has ever seen; and it has piled up the greatest national debt the mind of man has ever conceived. The magnitude of these things is beyond comprehension.

In like manner, the problems and dangers, political and economic, to be confronted in the era now commencing are the greatest of all times. There is no dodging or avoiding these problems. They must be met head on, and the watchword must be realism. To paraphrase the words of a recent commentator, when we look at the forest we must now see trees, and not fairies and elfin spirits dancing among the branches. During the past few weeks the world has witnessed the idealism of "charters" giving way to the practical realism of Stalin and Tito.

In facing the future the electric industry will do well to adopt a realistic point of view. Unquestionably, great market opportunities lie ahead, but the field is not limited to more appliances and greater use of electricity. It also includes a panzer division of diesel equipment and prime movers of all sizes which spell competition of the first magnitude. Woe be to the company which underrates the necessity of an understanding public, or underestimates the need for well-planned, intensified public relations activities.

The time is at hand for comprehensive nation-wide understandings and efforts to be accomplished by coordination among the "operating companies", first in regional groups, and then on a national scale.

Let's be realistic; let's get together, then pull together.

L. T. MERWIN

President, Northwestern Electric Co.

THE foremost obligations of the electric industry, now and postwar, are: (1) to continue more vigorously than ever our fight to protect and maintain the idea of self-supporting American business management in this and every other industry and (2) to conduct ourselves and our businesses in such a manner as to build and hold the confidence of our customers and the public generally in the system we represent.

Street lighting everywhere needs modernization, as Pleasant Grove, Utah, with Utah Power & Light help, did on April 21

New developments in high-temperature insulations, magnetic steels, plastics, high-frequency dielectric and induction heating, electronics and other fields are cited by W. C. SMITH, Pacific district engineer, General Electric Co., to show the great strides made by the electrical industry under the impetus of war. In this article based on recent addresses before electrical groups in California and Utah, Mr. Smith very ably discusses new developments and paints a postwar picture of

NEW ELECTRICAL HORIZONS

LARGELY as a result of war developments, designers of electrical apparatus now have available new materials for both the electrical and the magnetic circuit. As a result of extensive research, postwar apparatus will benefit from the use of high-temperature insulations and from high-permeability and low-loss steels. Economic studies, together with practical experience, will determine the extent to which these improvements will result in lighter, smaller and less expensive apparatus, or in higher efficiency.

During the last few years glass fibre has been produced to an unheard of degree of fineness. From a marble less than an inch in diameter, one hundred miles of fibre can be drawn, resulting in a fineness which gives great flexibility and strength. No matter how closely woven, however, into ribbon, tape or webbing, its electrical strength is dependent upon the varnish film laid on each side of it. Heretofore, these films were incapable of withstanding much higher temperatures than Class A (cellulose) insulations.

The chemists have now provided us with silicones, the much sought for material. Just as we have had available a long series of hydrocarbons with carbon as the backbone of the long chain molecule, we now have numerous silicones, in which silicon forms the backbone. There are no carbon to carbon bonds to break down under high temperature, but rather bonds of silicon which are of a sandlike nature.

Through the addition of organic components to the basic silicon-oxygen molecule, an amazing versatility is imparted to these silicone products, permitting high temperature resisting greases, liquids, oils, resins, rubber, putty and varnishes. Long life from glass and silicone insulated coils operating under temperatures even double those allowable for Class A insulations is now an actuality. Such insulations are, of course, ideal for intermittently operated equipment.

Insulations are often required where not only electrical breakdown strength but high mechanical strength is desired, such as in power transformers where, under short circuit, forces up to scores of tons may be encountered. Such insulation is afforded through the use of some of the modern synthetic resins. A special paper, thoroughly impregnated with the resin, is rolled up on a mandrel under high temperature and pressure, and then cured at a temperature higher than it will have to withstand in service. The result is a firm, rocklike board material possessing great electrical and mechanical strength.

During this war period, a problem has arisen in connection with our standard insulations as regards fungus growths in the South Pacific areas, where high humidities and temperatures are prevalent. Careful investigations with controlled oven conditions are under way, leading to development of new insulations and treatments which will not be subject to these fungus growths with their accompanying deterioration of insulation, and corrosion of metal parts.

An interesting development is a series of boro-silicate glasses with special metal alloys, which each have the same coefficient of expansion and contraction throughout the entire range of temperature in which they will be employed. They are cast together, affording an hermetically sealed joint. Terminal bushings for small apparatus may thus be made up, the leads being metal inserts in the glass, and a metal flange made available for welding or soldering to a metal cover, eliminating the need of gaskets.

The recently developed method of cold-rolling and annealing steel sheets so as to establish a "grain" structure is being perfected so that postwar designs will secure the benefits of high permeability and of low specific loss. The permanent magnets of today are well named, for vibration, temperature and normal demagnetizing forces have little effect upon them. Their lifting power is unbelievable, special constructions allowing the lifting of as much as 4,000 times their weight. Strange to say, some of the best of these new alloys utilize either aluminum or copper, both of which of themselves are absolutely non-magnetic.

The development of new plastics goes on apace with new uses showing up continually. Laminated plastic structures, utilizing glass cloth and the like, show amazing mechanical strength. The new "foam" plastic is incredibly light, being under 2 lb. per cubic foot. Being self-rising and self-curing, a quart of this plastic can be poured into a chamber, whereupon it will expand to 8 gal., filling every corner and cranny, having no joints, and giving extraordinary heat insulation.

The last few years witnessed the phenomenal growth of fluorescent lighting. New forms of these lamps are appearing in smaller diameters, and in concentric circles for decorative purposes. The quartz mercury lamp with its 5,000 to 6,000 c.p., in the size of a cigarette, which has been so useful in the photo-engraving and searchlight fields, seems to have found another fertile use in the lighting of television stages. Faced with the necessity of providing much higher light intensities than on the movie-stages, where the heat from the highly efficient modern lamps was becoming uncomfortable for the actors, the answer lies with the quartz mercury unit which is mounted in a water-cooled pyrex tube absorbing some 90% of the heat. In batteries of

three, to balance the load on the power circuit, light intensities of the order of 300 foot-candles on the television stage are quite practicable.

The germicidal lamp, whose ultraviolet rays streaming through a special glass have the power of killing airborne germs, will no doubt find extensive use in controlling the transmission of many diseases, in schoolrooms, lecture halls and the like. They will be installed in the air inlet ducts or installed in rooms in indirect reflectors, since the eyes must be protected against this radiation.

Very soon in the postwar period, we shall have in our homes the great convenience of a storage freezer, kept at a uniform temperature well below freezing. At any time during the year we shall then enjoy the luxury of placing on our tables fruits and vegetables, picked ripe in distant parts of the world, and retaining all their flavor and freshness. Economy will be afforded because of less food spoilage, and by promoting the purchase of foods in large quantities.

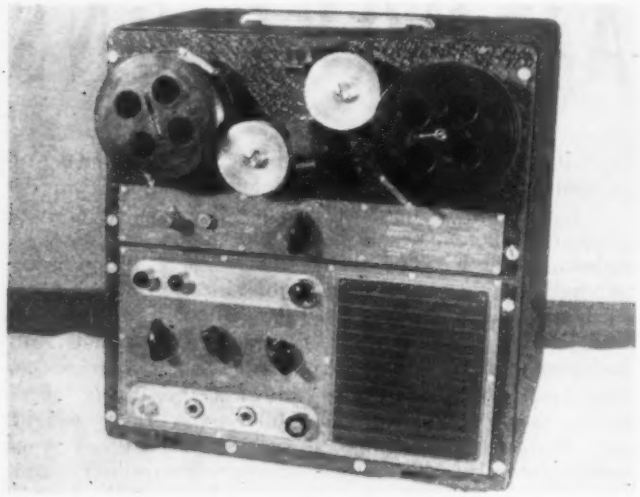
A development which has been tremendously accelerated by the war is the electrification of our aeroplanes. By push-button control, almost any operation is effected through small geared electric motors, and recorded on the instrument board facing the pilot. Here in order to be readily visible, have been provided small diameter, accurate instruments, of ingenious design and manufactured by mass assembly-line operations. It is interesting to observe the precautions taken in the production of these small instruments, in order to insure cleanliness and accuracy. A visitor finds himself in an air-conditioned, prehumidified room, wearing a smock, as do all the workers, in order to avoid the problem of lint getting into the bearings. Vacuum cleaners are spaced at frequent intervals, along the assembly belts. In order to prevent misshaping of the little coils used in these instruments, they are wound on napthalene forms, placed with the forms in an oven and raised to a temperature at which the napthalene sublimes, that is, it changes directly from a solid to a gas without passing through the liquid stage. An atomized spray of a synthetic resin plus a short baking period allows of removing, with forceps, coils which are baked solid with an impregnated "varnish", and thereby hold their exact shape while being mounted in the various instrument cases.

Referring further to the electrification of planes, it is interesting to note that the popular B-29 plane has over 150 pieces of rotating electrical equipment, and that over half of these are concerned with the control of the five-gun turrets. Through this equipment and electronic control, guided by an uncanny computer in each turret, some seventeen different variables such as air density and temperature, gravity, lead parallax, windage, etc., are integrated into the pointing of the guns in a corrected position with respect to the target so that bullet and plane will meet.

In the past few years we have become accustomed to high rotating speeds, such as with the turbine wheel of the supercharger. Recently, small diameter motors for grinding purposes have been manufactured, in which the speed of the rotor is 120,000 r.p.m., therefore 2,000 r.p.s. The motors are two pole, receiving their energy from a 2,000-cycle motor-generator set. The bearings are mist-lubricated.

The art of electrical welding, both a-c and d-c has been tremendously enlarged and improved by the war, particularly in the field of ship fabrication. The modern welding sets, together with suitable covered electrodes, and employing a carefully controlled technique, have assured a product which will stand up under the most severe conditions. Welding thin sheets of aluminum and magnesium, with an exact number of cycles per spot-weld, is now readily accomplished through electronic means. Two energy storage systems, capacitance or inductive, are available for this work, wherein the necessary energy is stored slowly and discharged rapidly, with the instantaneous demand on the supply system reduced by perhaps 90%.

The trend toward mobile equipment has been greatly intensified because of war conditions, in the saving of critical materials, and also as it allows of quickly setting up a substation or even a power plant in some devastated area. Another strongly augmented trend relates to the development of the unit substation, with its carefully coordinated equipment, and possessing 100% salvage value when load conditions have dictated that it is no longer needed at a given location.



The magnetic wire recorder (left) is an electronic device for reproducing sound and speech on steel wire. Recordings may be kept as permanent records or "erased" magnetically. Electronic heaters (right) used for surface hardening of gear teeth and other steel parts. Surface heat is produced by induced high-frequency eddy currents

Electronics

The extensive use of electronic methods of control in industry forms perhaps the most amazing chapter in the story of recent electrical developments. And to those of us who were taught that the atom was the very smallest thing in the world, and now find that it is a whole planetary system relative to the size of the electrons in it, nothing could be more intriguing. Through the use of minute electrical charges on the grid of a vacuum tube, and through the possibility of

a series of amplifications, extremely small variations in almost any category such as temperature, pressure, strain, speed, color, sound, light, etc., can now be made to control intricate processes and heavy equipment.

A most interesting application of the use of electronic methods is found in the inductive heating of metals by high frequency. Induction heating itself is of course not entirely new. For many years frequencies up to 10,000 cycles were supplied by rotating apparatus for this purpose; but for frequencies as high as 500 kc. and higher, electronic equipments are most suited. By means of the phenomenon known as "skin-effect," energy at a few hundred thousand cycles can be concentrated quickly in a thin outer layer of metal such as the wearing surface of a gear, bringing it to a white heat and then being quenched, while the remaining metal is left untouched, with its toughness intact.

Through the use of specially shaped heating coils and automatic timing, this electronic method of inductive heating is beautifully adapted to work involving the brazing and soldering of small parts on a moving assembly line. A number of electronic sets have been standardized for use in inductive heating, in sizes to 50 kva. and larger.

With frequencies raised to several million and energy applied to parallel metallic plates, dielectric heating is filling a very useful place in industry. Plywood, cloth, string, etc., can be heated uniformly throughout the mass, every particle being subjected to its own loss in the high-frequency field. Such a method is obviously far more satisfactory and accomplished quicker than endeavoring to transmit the heat through outside layers of poor heat conducting material. Possibilities in the field of induction and dielectric heating intrigue the imagination, and new applications are developing rapidly.

Considerable refinement on Poulsens' invention of magnetic recording has been made in the past year or two, resulting in a compact, reasonably light machine, which combines recording, reproducing, and erasing of the record. Under battle conditions of severe vibration, tilting to any position, etc., an hour's recording can be made on the two-mile length of 4 mil piano wire, without the observer taking his eyes from the scene of action. Erasure is accomplished by a 30,000-cycle current flowing through a coil. On the other hand, a given record can be reproduced many thousands of times with only slight loss in volume. No processing is necessary after recording, all that is required being merely to rewind and go ahead.

A new electronic tool which has opened up an entirely new field is the electronic microscope. Just as one can shape glass lenses and refract light rays in the light microscope, obtaining say 1,000 magnifications, now suitably shaped electromagnets or positioned electrostatic plates can refract the much shorter wave length beam of electrons and rapidly obtain 10,000 to 25,000 magnifications. By enlargement this is easily increased to 100,000 times. At this enlargement, a human hair is approximately 40 ft. in diameter and a dime becomes a mile wide. The specimen is mounted on a very fine screen in the vacuum chamber, and readily positioned by means of a sylphon bellows attachment.

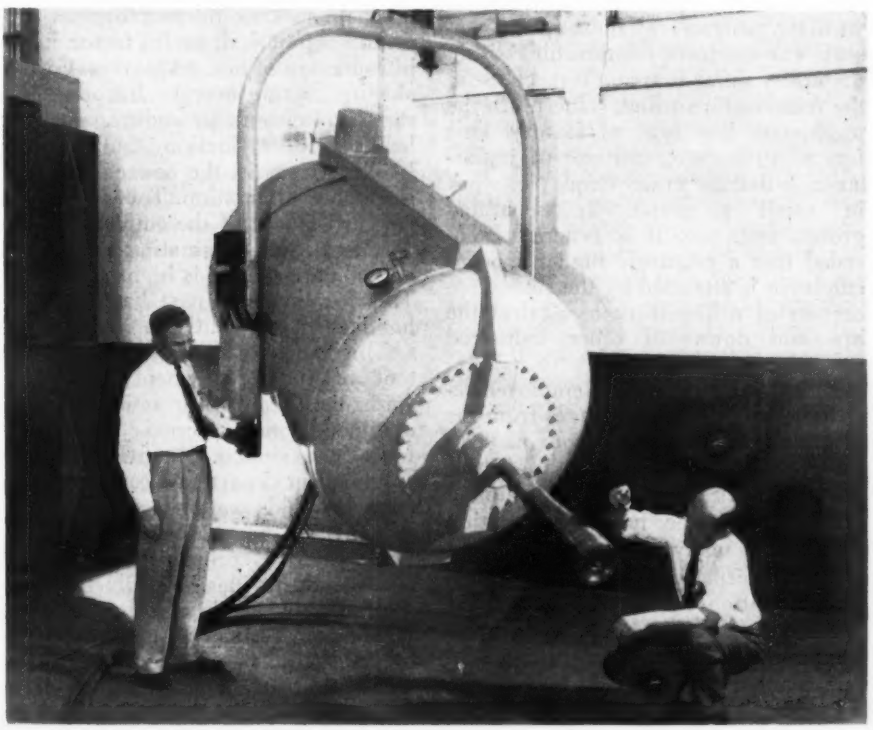
It has been most interesting to follow the development of high-voltage X-ray sets, culminating in a 2,000,000-volt design which is housed in a cylindrical tank only 8 ft. long and 5 ft. in diameter with a total weight of approximately 5,000 lb. This compactness is made possible by employing a 180-cycle resonant circuit, thus eliminating the heavy iron core, and making use of a high-pressure special gas for insulation instead of tons of oil. With this two million volt equipment, it is entirely feasible to obtain stereoscopic pictures through 12 in. of solid steel, so that a defect may be studied and exactly located within that depth.

The intensive wartime investigations in micro-wave phenomena have materially improved the art of television. On a recent visit East the writer found keen interest in watching a football game on the television screen, and which was being televised some 200 miles away. The various plays and the passing of the ball were readily followed and, had the referee been an acquaintance, he would easily have been recognized. It was intriguing to realize that some thirty times a second, a quarter million separate light impressions were finding their way electrically through the circuit.

A demonstration to department store managers brought out the possibilities of presenting say a fashion show at a main store and at the same time by television offering this show at each branch store. Another demonstration brought out the value to be obtained by televising special displays anywhere in a store and showing them in the front window down on the main street. In this way the whole store may be "brought down" to the shopping crowd passing by one's store.

A wartime use of television has developed out of the need of observing closely certain hazardous operations. With the observer well protected behind a wall every detail can be seen by television, the only hazard being the loss of the televising camera.

Space will not permit discussion of many other new developments. The great possibilities of radar, for instance, new strides in radio and communication, the gas turbine and jet propulsion, to mention only a few. Suffice to have sketchily covered some of the highlights in the hope of showing new horizons for the electrical industry that lie ahead.



New two-million volt X-ray requires only 3½-minutes to radiograph an 8-in. steel casting instead of 4½-hours with its one-million volt predecessor

R. G. KENYON, Southern California Edison's vice-president in charge of industrial relations, knows whereof he speaks when he discusses the relationships of management and employees. His first power company job was in the personnel department where he could use his university education in psychology. Later he became advertising manager, a job where knowledge of people and attitudes is of paramount importance. In all relationships experience has taught him that

SQUARE DEALING WILL WIN

FORTY years ago, when John B. Miller, then president of the Southern California Edison Co., wrote that "good service, square dealing and courteous treatment" should be the guiding principles by which Edison men and women would further their good relations with their customers, he also established an ideal for present-day industrial relations. This pattern could well apply to any industry because it does apply to all conditions surrounding the employee in relation to his job, his supervisor, his fellow employees and to his company.

Much study and work has been done in many industrial fields to determine the scope and effectiveness of industrial relations programs, and the work of this kind pertaining to the problems peculiar to the utilities has kept abreast with the progress of industry in general. The employee relationships within the utility differ in many respects from the relationships which come up in the production line type of factory. One fact of difference, and one of importance, is that the utility employees work in small geographically separated groups and, too, it is generally conceded that a relatively higher type of employee is attracted by the steady operation of utility work as against the ups and downs of other industrial operations.

Industrial relations, or employee relations, has taken many pages from the older book of public relations of utilities. Fundamentally, both of these fields of work have to do with human relationships. The industrial relation worker has many aides which do not have counterparts in the older field of public relations; many reasonable and definite procedures have been developed in the industrial world which with few changes can be made to apply to this same field of endeavor for a public utility operation. Among these personnel helps are:

1. Proper employment procedure—properly established and supervised.
2. Adequate training for supervisor and worker levels.
3. Accurate knowledge of the worth and content of job analysis and evaluation.
4. Sound, consistent wage and salary policy controlled by capable, experienced technicians.

The employment office of a utility is usually the first contact for the average individual with the company. At this point an opportunity is offered to make a lasting favorable impression which can be mutually beneficial throughout the employee's career with the company. Many utilities have accomplished much in making the employment procedure a practical, useful factor in the introduction of new employees. Certain sideline factors may be introduced in the employment procedure, such as helpful indoctrination bulletins or booklets to assist the new employee in his or her orientation. Too, the proper physical layout of the employment department itself, eliminating any "cattle-chute" atmosphere, is highly desirable. This for the most part has been well handled by the utilities.

This article will not discuss the content of the employment application form, the use of information which is obtained from a properly constructed form, and similar benefits which the employment department can render the company. This matter is an entire subject in itself and deserves close study.

The need of proper training facilities in industry has been illustrated by their effective use in rapidly expanding war industries. Every supervisory employee should be afforded some lift or stimulation at regular intervals if he or she is to maintain a fresh and enthusiastic attitude toward the job. Workers below the supervisory level need the same mental stimulus to keep them alert, alive, and interested. Training to bring about these objectives of our various organizations is imperative. There is, unfortunately, some reluctance on the part of a segment of old-line supervision to the introduction of the new training procedures, apparently stemming from the fear that such procedures imply something lacking in them, personally. This is one of the first problems to be met by the industrial relations organization charged with the introduction and handling of such training material.

Experience leads to the belief that this does not constitute an unsolvable problem after all, even in an old established institution such as the typical utility organization. Virtually anyone in any walk of life will accept help if he can accept that help without too great an obligation to the helper. In other words, the training department must be helpful to the supervisors in a manner which will not be theoretical, but which will be actual help to those same supervisors.

Accurate account is kept of the physical properties involved in a utility system. The age, condition and efficiency of property are carefully measured and tabulated. Possible useful years are charted and the rate of depreciation is measured as accurately as engineering and accounting practices will permit. But when it comes to knowing the actual facts pertaining to the various classifications of work which are performed by the human beings, or the actual measurement of the effectiveness of any human or group of humans in any of these classifications, there is a great paucity of factual information.

While it is impossible to be final in the judgments which are made per-

taining to the evaluation of job classifications and working conditions surrounding them, much has been done to elminate guess work in this important field. For job classifications of ranges below $3,000 a year, accurate job evaluations based upon the nature of the work performed, the level of skill exercised, and working conditions inherent in the job are possible. In this organization level it has been found advisable to give greater weight to these factors in determining an individual's level of compensation than it is in the classifications which earn above $3,000 a year. In this latter group, and as the salary range increases, it is necessary to attach greater significance to differences in individual contribution of the employee while still considering comparative job levels. In the whole field of job evaluation there have been bench marks established that are measurably helpful, and we believe it is possible for a utility to bring into effective use an evaluation program executed by a properly selected and adequately trained group of qualified men from its own organization. Job evaluation work is one of the most valuable tools of management, because fundamentally the price paid for the job is the crux of most industrial strife, and if the price paid for the job has been established on a legitimate set of values and is not merely the result of history and unrelated judgments on the part of a number of supervisors, then management is in a position to know whereof it speaks on this most controversial subject.

This leads to the fourth subject listed, that of establishment and administration of a wage and salary policy or program. Every individual, regardless of his place in life, resents most bitterly anything which to him is an injustice. The fact that this feeling of injustice may have been brought on by a lack of knowledge or information on his part has nothing to do with its effect on his thinking and his effectiveness as an employee. A properly established and functioning job evaluation section of a company can do much to dispel the mumbo-jumbo fear concept of wage and salary fixing which is so often present in the employees' minds. A consistent application of a fair and understandable wage and salary procedure will help dispel the distrust which appears to be so close to the surface in the average employee's thinking. Continuous, earnest study of wage and salary problems and consistent, objectified application of the findings of this study will serve to raise employee morale to an effective level.

The whole question of the relationship of the employee to his boss and to his company and to his fellow employees has been complicated in recent years by the increasing emphasis upon collective bargaining through a union, and an effort on the part of great segments of our national life to inculcate the thought that there are two kinds of people in this world: labor people and other people. We find that evidence in the great urge to establish what popularly is known as labor-management committees, and the effort on the part of certain union followers to further the thought that there should be such a thing as a "representative of labor" around the management table. When it is remembered that in America the old story of three generations of from shirtsleeves to shirtsleeves still has some foundation, it can well be seen how utterly absurd is this concept. No intelligent leader of an industry will deny the fact that the combined knowledge of the minor techniques of the job, as represented by the total mental grasp of that job by the entire employee group, will be greater in amount than that same type of knowledge in the minds of the supervisory group.

It should be apparent to any leader that the combined amount of information possessed by the working group concerning the intimate details of the job itself will in many cases exceed that of the supervisor's knowledge of those details. And it is an intelligent management that reaches into the minds of its employees by means of suggestion programs and the like, to obtain the helpful and progress-making suggestions which will further the total cause. But to say that because a man is not a "supervisor" but is a "worker," that he therefore constitutes an entirely different type of individual, and that he and his fellow-workers are entitled to representation in management circles, is palpably absurd. If an individual worker in the group has that type of mind which lends itself to decision-making and to the assumption of responsibility for not only his own work but that of others, and is willing to exert himself to the necessary extent, he will find that this type of ability is not only recognized but welcomed. This is the procedure which has been used effectively in developing leadership in the working ranks of our nation for over a century and a half.

Most utilities have during the years developed a certain number of industrial relations functions, and these functions have gravitated to the particular department or departments that seemed at the time to be their most logical recipient. Present-day developments in the industrial relations field indicate a need for centralizing of these functions under a single head, and the placing upon this head the responsibility for the proper carrying on and development of industrial employee harmony. In former days, it was possible for a man to have a small factory in which he would employ a half a dozen men. He would personally work with them, and would be intimately aware of the family history, personality, and the entire background of each of them. In effect, this boss or manager or owner performed all of the personnel or industrial relations functions which are indicated as necessary at the present time. They were simple, and carried on in connection with what he would have considered a normal obligation of the owner of the business. Now industrial organizations have grown larger. We have on one side the injection of governmental regulations and on the other the pressure of organizations operating under what amounts to governmental sanctions. No one man can carry on the normal line functions of an old-time manager of a business, and at the same time take care of all the multiplicity of details pertaining to the new relationships that have been established in modern business.

Consequently we find that the industrial relations department is a normal development, and has become a necessary part of virtually every industry. In the establishment of such a department, the utilities have not been in the van. As a matter of fact, many utilities have been reluctant to establish such a department. There has been the feeling on the part of some executives that the establishment of such a function would deprive the line organization of certain of its rights or prerogatives. But it is becoming more clearly apparent that a properly organized industrial relations department can be of measurable helpfulness to the line organization, and can more than carry its share of the total load. The utility industry is turning to studied industrial relations practices to meet the conditions of a new day.

It should not be concluded that it is possible to administer industrial relations of a utility by the mere application of a number of laws and regulations, however carefully they may have been worked out, or however practical and useful they may be. There has never been a time when the need for judgment in the handling of our employees was greater. There has never been a time when the need for fair, unbiased, honest judgment in the handling of these great and growing problems was greater. Problems pertaining to personnel offer one of the great challenges to industrial leadership, and it is not a challenge which we may take or leave. It is a challenge which must be met, and which must be met properly. There is no possible way to buy good harmonious *industrial relations*. It *must be earned*.

Because everyone has been busy with more obvious troubles, few have noticed the growth of a new challenger in the channels of distribution, the Cooperative. Aided by socialistic government agencies, favored with income tax exemption which it may now umbrella over its own manufacturing plants as well as wholesale outlets, advertised without cost by schools, colleges, government agencies and unwitting labor organs, it is time that all of us pay heed to that ominous warning.

THUNDER ON THE LEFT—CO-OPS

ELECTRA'S husband has a right to worry about cooperatives invading the appliance business. After the war, this new competition won't be confined merely to a Co-op Union that advertises itself on a couple of mimeographed sheets (ELECTRICAL WEST, Vol. 93, No. 5). Just a couple of months ago, one of the super-super co-ops—Big Business however you look at them—announced that it was going to sell appliances on a really grand scale.

National Cooperatives, Inc., is the organization—make note of its name. For National not only says that it is aggressively entering the appliance field in preparation for postwar distribution of refrigerators, radios, water heaters, home freezers, washers, vacuum cleaners, toasters, stokers, irons and a host of other home and farm electrical appliances, but it also says it is going to establish repair, service and promotional facilities through local and regional co-ops. If that doesn't add up to a severe migraine headache for everyone from G-E on down to Arthur's Appliance Store on Main Street, you don't know your cooperatives.

Since 1929 the cooperatives in this country have quadrupled their annual business—last year they grossed over $5,000,000,000. And they've gone into practically every line of business from banking, through mining, petroleum refining and insurance, to manufacturing tractors and selling beauty lotions. What's more, they are growing at a rate that careful computation shows to be ten times that of their private-enterprise competitors.

How have the co-ops managed to make such spectacular gains? Ask Uncle Sam.

Thirty years ago, in one of its moments of concern for the fate of American agriculture, Congress wrote into the law a provision that farmers, fruit growers and like associations, organized and operated on a cooperative basis to act as selling agents for members and to return all earnings to members in the form of so-called patronage dividends, should not be required to pay the federal income tax.

Over the years that original exemption has been stretched in many ways. Both by federal laws and by bureaucratic rulings, additional privileges have been given to the cooperatives.

For instance, they cannot be declared a monopoly. They can give rebates and discounts, which are forbidden to other businesses. They are given preference in the purchase or sale of products for the government's account—though the law says only that they shall be given recognition and encouragement. They can issue securities without SEC scrutiny or approval. They can break through price ceilings established by OPA. They can borrow federal money on highly preferential terms.

Today, as the result, cooperatives both large and small—often engaged in businesses that are very far removed from the grassroots farmer and fruit grower—are also given federal income tax exemption under the simple terms of Section 101, Internal Revenue Code.

What this means is obvious: The co-ops are expanding at the expense of private enterprise and of taxpayers in general. At a time when private enterprise is paying up to 80% of its earnings in support of war effort, the co-ops are pocketing their earnings and using them to finance their invasion of new and more profitable markets.

The co-ops are no different from any of us in one respect: They want to do more business. Right now they sell to less than 10% of the American buying public—mostly to farmers. Ultimately they aim to sell to every man, woman and child.

There is more behind this very human desire than a wish to grow, however. Some of the cooperatives quite frankly admit that they want to set up a new way of life, which a few of their leaders like better than the old American system.

Says Dr. James Peter Warbasse, president emeritus of the Cooperative League: "The ultimate destiny of the consumers' cooperative movement is to obtain or to produce in factory, shop, mine, sea, air and land, all that the consumer requires. . . . As cooperation grows, the need and possibility of the existence of profit business and of the political state decline. . . . The cooperative movement is tending toward a cooperative democracy as a substitute for the political state. . . . Cooperation already has in operation the machinery which is capable of being a substitute for the political machinery of the state."

When he was vice-president, Henry Wallace said: "The cooperative way of life must dominate the community. . . . We may hope that such action may be taken . . . bloodlessly."

That these gentlemen, and others like them, are not talking just for the exercise has been shown in the Province of Saskatchewan, where the Cooperative Commonwealth Federation won a recent election. CCF now proclaims itself openly as socialism. It is appropriating taxpayers' money to promote the extension of tax-free cooperation into all lines of business.

In this country, of course, the co-ops haven't won any elections yet. But they're making progress. Because that tax exemption status they enjoy is a powerful stimulant. Consider how it benefits them:

John Washer & Sons is an independent appliance dealer. Last year, in spite of the fact that the company had no appliances to sell, it managed by

hard work and ingenuity to net $5,000. Of this amount, John Washer owed and paid to the federal government $1,000—which left him just $4,000 to support his family and to carry on his business this year.

Down the street from John is the Co-op Union. It also managed to net $5,000 last year. But the only thing it owed the government was a sheet of poper stating that its earnings came to this figure. It didn't pay one red cent to Uncle Sam in support of our soldiers and sailors fighting overseas.

If John Washer hears of this and, in his anger and ignorance, asks the Co-op Union manager how come, he will learn a bitter, revealing lesson: "You see, we don't have any profits."

"No profits!" cries John. "What do you call that $5,000 net income but profits?"

"Why that's a saving," says the co-op manager. "It belongs to our members. We return it to our patrons—the people who bought from us—as a patronage dividend."

Naturally that doesn't make any more sense to John Washer than it does to most independent American business men. After all, what is the difference between the so-called savings dollar of the cooperatives and the profit dollar of private enterprise? Both are the property of the owners of the business—of the stockholders of the corporation and of the patrons of the cooperative, (which probably is also a corporation). If the profit dollar of private enterprise is subject to federal tax, then by all rights the co-operative profit, or savings, dollar should be taxed on the same basis.

But it isn't—and that's why the co-operative threats to enter the appliance field, and all other fields, should be taken so seriously.

Take the case of National Cooperatives. National was organized in 1933 by eight large regional super cooperatives as a buying pool to purchase motor fuel and oil. These associations were owned in turn by 577 local co-ops with a total membership of 500,000 persons. Today National is owned by 17 regional co-ops (four of them are Canadian organizations) which are owned by 2,539 local associations with a combined membership of more than 900,000 persons. There's a ready-made market, to be sold easily and without much advertising.

Up to 1943 National was, like most of the super-super co-ops, a purchasing organization: it confined its activities to pooling purchases of its member associations and to the negotiation of master contracts for joint purchases of goods which were stamped with the co-op label. Then, in line with the trend, it moved into producing field.

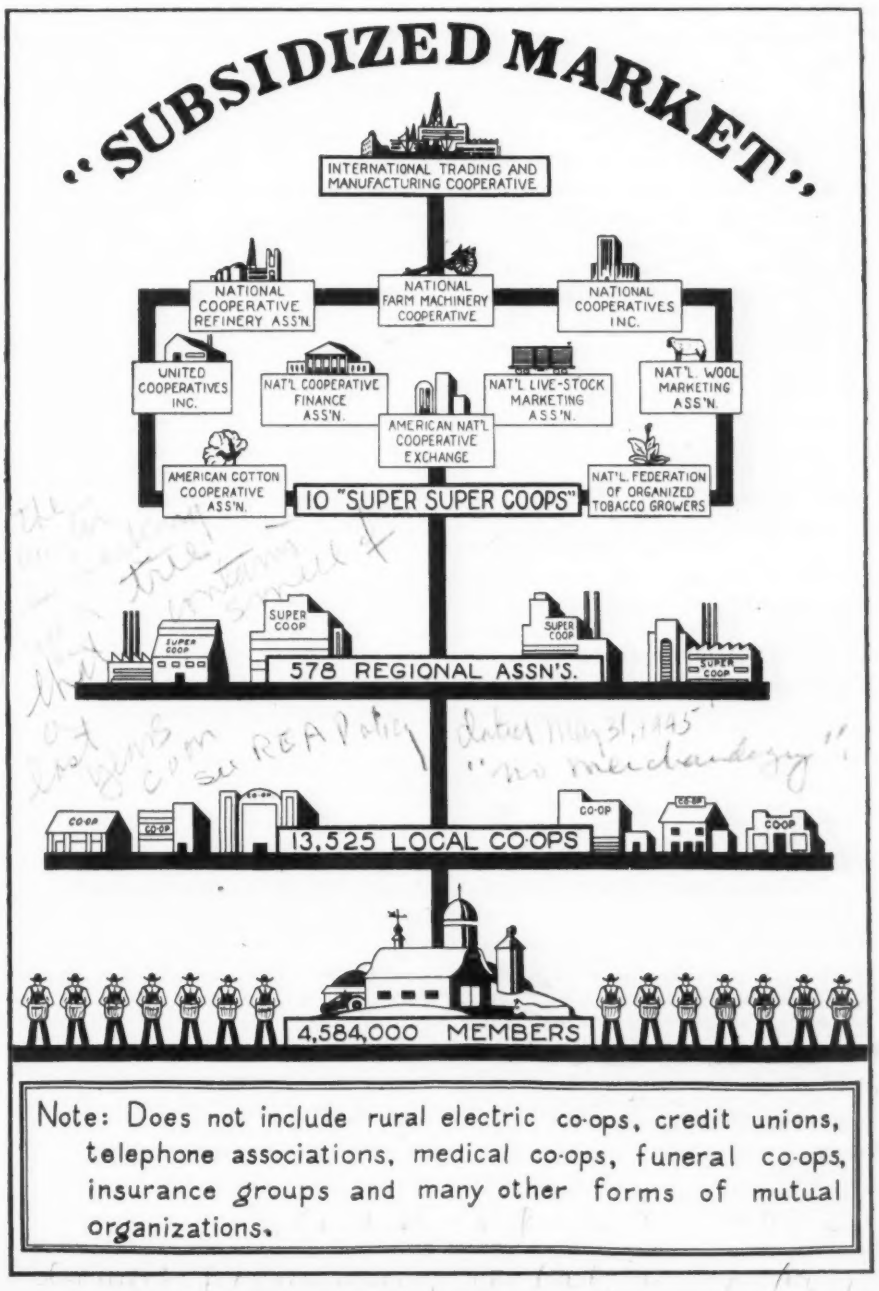
In the realm of the private enterprisers, this is not a step to be taken easily. The co-ops are able to take it without even breaking stride. For here is another funny thing about the co-operatives:

Instead of paying their so-called "patronage dividends" in hard American cash, they frequently pay them in stock, which, since it isn't listed on the open market, has no determinable value and is redeemable only when, as and if the directors of the co-ops want to redeem it.

Thus the co-ops are able to build an inverted pyramid of their earnings. Whenever they want to undertake a new activity, they have the assets.

National Cooperatives was as well fixed as any of its big associates. So in 1943, when it decided that it wanted to make cosmetics, shampoo mixtures and other household products, it had, on its own and through its super-cooperative owners, ample credit to buy a chemical plant. Then it found another $200,000 and purchased the plant of the Universal Milking Machine Co And early in 1944 it bought another plant—this time a large redwood shingle mill on Vancouver Island.

This is the organization that now says it is going to sell electrical appliances after the war. Can it do it? Well, it's done everything it set out to do so far. And even if it fails, there are other super-super cooperatives that are sure to follow in its path because of all the business that is expected in the appliance field.


"SUBSIDIZED MARKET"
INTERNATIONAL TRADING AND MANUFACTURING COOPERATIVE
NATIONAL COOPERATIVE REFINERY ASS'N.
NATIONAL FARM MACHINERY COOPERATIVE
NATIONAL COOPERATIVES INC.
UNITED COOPERATIVES INC.
NAT'L COOPERATIVE FINANCE ASS'N.
AMERICAN NAT'L COOPERATIVE EXCHANGE
NAT'L LIVE-STOCK MARKETING ASS'N.
NAT'L WOOL MARKETING ASS'N.
AMERICAN COTTON COOPERATIVE ASS'N.
10 "SUPER SUPER COOPS"
NAT'L FEDERATION OF ORGANIZED TOBACCO GROWERS
578 REGIONAL ASSN'S.
13,525 LOCAL CO-OPS
4,584,000 MEMBERS
Note: Does not include rural electric co-ops, credit unions, telephone associations, medical co-ops, funeral co-ops, insurance groups and many other forms of mutual organizations.

This structure is erected on federal income tax exemption accorded co-ops. One of the "big-business" co-ops plans entry into home appliances

But wait a second, you say: Where's it going to get the appliances to sell?

That question won't bother National for a second. If it follows the established practice, it will try first of all to buy the appliances from one of the established manufacturers—just as the mail-order houses have done in the past. Maybe it won't get very far in this attempt. Having girded for the coming postwar battle just between themselves, and having labored hard and long to set up the most efficient possible distributor-dealer organization, the appliance makers are not likely to sell themselves short.

No matter—there's a much easier way out for National. All over the country are little, medium and big war-trained manufacturers who are just looking for something to do after the war. They'll be glad to build refrigerators and ranges bearing the "Co-op" label. If they need bigger factories or more machinery, government will have plenty of war plants to sell—and co-ops are always favored in deals of that kind.

Then the day will come when National will decide it can make more money and build appliances cheaper if it operates the factories itself—if, in other words, it makes them part and parcel of its own tax-exempt self. So reserves in hand and ample government credit available on easy terms, it will go out and buy up the factories just as it has already bought up the chemical plant, the milking machine company and the shingle mill.

It won't haggle over the prices it is asked to pay; the records show that co-ops quite generally pay more than the appraised value and liquidate the cost quickly out of tax savings. No, it will just wade into the business and come out a first-string appliance manufacturer in its own right. That's when the fur will really begin to fly.

Okay, you say, let it fly. We've met the competition of the department stores and the chain stores; I guess we dealers and distributors can take care of ourselves somehow against these upstarts. Don't kid yourself. The local selling agents will be the first to fall in this coming battle.

You can probably name a number of manufacturers who went out of business because they didn't or couldn't line up a string of aggressive dealers. So can the co-ops. And they've learned the lesson. They know that their strongest appeal is to the ultimate consumer, the public. And so they are going to do their best to establish local retail outlets that can get and hold customers.

It doesn't matter whether National Cooperatives, Inc., establishes its own string of local co-op stores or whether its appliances are sold through independent co-ops. The cooperatives are closely knit. They have agreed not to compete among themselves. (And they cannot be declared a monopoly.) In its attempt to sell appliances, therefore, National will have the backing of every single cooperative and cooperator in the nation.

And don't forget that it will also have the backing of Section 101 of the Internal Revenue Code.

And so will the local co-ops which compete directly with you. While you're busy paying the taxes which will help Uncle Sam to pay for the war and all the postwar reconstruction that must be done, they will be busy feathering their own nests.

Don't make the mistake of putting all this down as just a pipe dream. Read the co-op papers and their news releases and you'll find that on Jan. 30, the executive committee of National Cooperatives, acting on the recommendation of a special technical refrigerator committee, authorized the expenditure of between $30,000 and $40,000 for preliminary designing and engineering of the new Co-op refrigerator; that the engineering firm of Barnes, Reinecke & Rebholz has been retained; that the building of test models will begin as soon as designs are approved by National's appliance committee; that laboratory and field tests will be run as quickly as possible.

You'll find, too, that home freezer boxes have already been under test for the past ten months; that a line of Co-op branded radios is being designed, with consideration to television and FM receivers; that several washing-machine manufacturers are competing for that co-op business; that two models of vacuum cleaners will be available as soon as the war is over; that there will be large-volume production and local-co-op distribution of irons and table appliances; that new production facilities are under construction for the manufacture of co-op water heaters and other items. All exempt from paying federal income tax!

Make no mistake about this either: The co-ops are going to put a very sad crimp into our old American way of doing business unless something is done to stop them. That doesn't in any way mean putting them out of business, or destroying the cooperative movement, which would be as un-American as the co-ops' present way of doing business.

It means tax them just as every other business is taxed! So far only two definite steps have been taken:

1. The 1943 revenue bill, passed by Congress last spring, contains a provision that tax-exempt corporations such as cooperatives, labor unions and mutuals should for the first time file with the Treasury Department "information" returns as to their financial affairs. Said the House Ways and Means Committee at that time: "It has come to the attention of your Committee that many tax-exempt organizations and corporations are directly competing with companies required to pay income taxes, and that this practice is becoming more widespread and affording a loophole for tax evasion and avoidance. . . . It is the intent of your Committee to make a thorough study of the information contained in such returns with a view to closing this existing loophole and requiring the payment of tax and the protection of legitimate companies against this unfair competition."

2. A year and a half ago, there was set up in Chicago an organization known as the National Tax Equality Assn. whose aim is to study tax inequalities of all kinds and to publicize the results of its findings. Today, through its members, NTEA represents nearly 2,000,000 businesses in 45 states.

NTEA is doing a big job for business men. But the co-ops not only have a powerful lobby in Washington; they also have the active support of the three big national farm organizations and the growing interest of CIO and AF of L. So every man who believes in the system of free private enterprise must also get in and pitch against this tax inequality which is threatening Democracy's very existence.

EEI Guide

For the business managed power companies which intend to continue to sell direct to consumers, at least certain appliances, the Edison Electric Institute has issued a "Suggested Appliance Merchandising Principles" report to its member companies as a guide in planning residential load building activities. It has been prepared by a committee of the Institute investigating the relationship of utilities and retailers in the postwar period.

In brief the principles suggested include open franchises so that dealers may sell the same makes as sold by the utilities, fair and open competition, quality appliances, adequate maintenance service, sales emphasis on equipment not having adequate customer acceptance, offering of inducements and making it possible for retailers to join in, advertising that recognizes and supports retailers, term of payments which dealers can meet, making available basic sales training and information on appliance operating cost and establishing compensation plans for salesmen which will lead to goodwill and understanding between utilities, dealers and the public.

RAY W. TURNBULL, as you know, is a hometown boy from the West who did so well he was taken East to rise to the top of a large manufacturing enterprise, the Hotpoint, or really the Edison General Electric Appliance Co., Chicago. He is now president, but he began by selling Hotpoint irons, made at Ontario, Calif., door to door. A keen merchandiser, he is in a key position to tell this convention why it is necessary for everyone in the electric industry to begin now to

SELL USE-VALUE OF APPLIANCES

AMONG the many fine things contributed to American life by the Western states has been leadership in the art of electrical living. The great growth of the West has been closely associated with the development of its electrical facilities. Westerners early saw the advantages of electricity as a close ally in their everyday home activities, as well as in the business sides of their farms and industries. Viewed today, in a manner of taking stock in this hour immediately before the dawn of a brighter day, we see a greater new West enjoying new and better standards of living, setting a pattern to be followed by other sections of America.

The rewards promised to those who toil for greater application of the mighty energies of the vast electric industry are large and satisfying. The future also holds a challenge that is of a piece with the opportunities offered. The keystone position of the electrical industry in America's future places an obligation upon each worker in the various branches of the industry. We see two broad objectives:

1. To make plans now to better acquaint the public with the full potential of electricity's benefits.
2. To study the problems of the industry's expansion from the long point of view so as to prepare ourselves adequately for the larger task of performing an ever broader service.

The surest method of realizing fulfilment of our potential is to plan to keep our products and services the best; to give more service to more people at lower cost—and to keep the public fully informed as to our objectives. The starting point in this broad public information program should be among our employees and our product distribution agents who meet the public. Whether a member of our industry meets our customer on a service need, on credit service, or as an appliance salesman, he should be prepared to inform as to the fullest value available from electrical living.

As manufacturers, we feel a new sense of responsibility toward the training needs of those employees who meet the public or instruct others. Employees returning from the armed services will need this training, as will others whose customer assignments will be new. We are convinced that in the past, product development too often outpaced our facilities for acquainting the public with newer *use-values* engineered into electrical equipment. Our postwar merchandising and sales, as well as product service training program, is aimed at correcting this.

In undertaking a broader program of education in the *use-values* of electrical equipment for better living, we have attempted to gear our efforts to the already visible needs of a greatly expanded industry. To cope with an industry of double or treble its present size we must orient our thinking to meet the new conditions that expanded operations will impose.

Series of merchandising training booklets sent to dealers and which received highly favorable response everywhere

Our plans for "taking in stride" the expanding demands, are grounded in: (1) more thorough training for our employees in sales and service work, as well as stronger dealer training; (2) a larger conception of market research making constantly available complete data on the potential for electrical expansion in all parts of the country.

To explain our training program, it is easiest to start at the retail level and work back to our people. During the war years we have conducted a home study course, "Planned Electrical Merchandising," dealing in the principles of merchandising. Departing from precedent, that course has been supplied at no cost nor obligation, to 17,000 retailers. The material does not mention the names nor features of our products. The training material is prepared and sent to the dealers purely as an educational service. We hope to gain by benefiting along with the rest of the industry, and will aid materially in developing several thousand of better informed electrical dealers.

Our second venture along educational lines is embodied in a kitchen planning guide, *Your Next Kitchen*, in which we show several plans for ideal complete electric kitchens. The customer can procure a floor plan for one of the electric kitchens at no cost by returning a card enclosed in each booklet. We feel that this service has made potential complete electric kitchen customers of a majority of the more than one million families that have ordered the guide during the past year. Local electric utility companies and their independent dealers, many of them trained in part by the "Planned Electrical Merchandising" course, will work with this million potential owners of electrical homes.

To implement our training efforts at the wholesale level, we are developing plans in cooperation with our distribu-

tors by which they will be represented by a "new building and remodeling" man to familiarize builders and architects as well as our department and furniture store dealers with the mechanical means of installing wired-in electrical equipment in new and reconditioned homes. We are not greatly concerned with the accuracy of predictions as to the number of homes to be built annually in postwar. We know that when Americans are employed they want better living, and we know that better living means both new homes and remodeling of present structures. It is our aim to furnish as much information to those planning new and finer homes as we are able to get to them.

While the training phase of our plans for the future is focused on the immediate postwar period, we have a parallel endeavor pointed at the "long pull" and spearheaded by market and product research. The product research will speak for itself in the advanced designs and operating principles of our equipment; what we do on those things is of great importance to us; to the industry, a greater importance is attached to our market research.

To determine the future electrical merchandise potential in a given trade area, our market research division puts together a body of information containing the answers to more than thirty specific questions. Starting with the 126 basic key markets of the nation, the key or center trading area is identified. The rates for all classes of electric service, for competitive utility services, the relation of solid fuels to the market, the average income of the citizens, are a few of the many questions for which we seek an answer before we attempt to say how much additional electrical equipment should go into that territory in a given period. Our decision as to the length of time that will be required to electrify a given specific percentage of the homes of the area controls the size of our wholesale operation.

The big importance of market research is not alone its value to the manufacturer, but not infrequently we are able to see conditions effecting local operations through coldly analytical figures that escape the notice of people in the industry who are located within the area under study. An example of a specific project in market research is our 1944 Public Utility Merchandising Survey, which has been used to determine future courses by several utilities. Knowing that electric utilities were formulating merchandising policies that best fitted their communities for postwar, we asked them several questions that would throw light upon the trend in merchandising developments. For example, in order to show the number of dealers selling major electrical appliances in the various utility operating areas in the years 1941, 1942, and 1943 in a more uniform way, we show the number of dealers for each of the periods mentioned, broken down per thousand meters on the basis of domestic meters served in 1943 (see Chart 1.)

For ranges, water heaters, and refrigerators, the number in service on utility lines in 1943 show the saturations in Chart 2.

CHART 1

Year ending	No. of dealers per 1,000 meters
December 31, 1941	1.6
December 31, 1942	1.4
December 31, 1943	1.0
Victory plus 1	1.7

CHART 2

	1943 saturation
Ranges	13.0%
Water Heaters	4.2%
Refrigerators	65.5%

CHART 3

	No. of answers	% to total
Merchandising	181	63.3%
Non-merchandising	90	31.5%
No answer	15	5.2%
Total	286	100.0%

CHART 5

No. of brands to be handled in 19V1	Merchandising utilities	% to total
Fewer	34	18.8%
Same number	85	47.0
More	22	12.1
Uncertain	21	11.6
No answer	19	10.5
	181	100.0%

CHART 7

After the war, do you expect to have more retail salesmen than in 1941?

		% to total
Will have more	100	38.5%
Will have same number	121	42.3
Will have less	3	1.1
Uncertain	11	3.8
Will not have salesmen	15	5.2
No answer	26	9.1
	286	100.0%

CHART 4—Appliance Merchandising

	—1941—		—19V1—	
	Number of utilities	% to Total	Number of utilities	% to total
Total number of utilities merchandising	184	....	181	....
Ranges	180	97.8%	173	95.6%
Water heaters	175	95.1	171	94.5
Refrigerators	154	83.7	143	79.0
Dishwashers	68	37.0	123	68.0
Clothes dryers	13	7.0	105	58.0
Disposalls	50	27.2	109	60.2
Clothes washers	124	67.4	123	68.0
Ironers	122	66.3	118	65.2
Household quick-freeze storage units	16	8.7	140	77.3

CHART 6

If you do not merchandise, will you have a cooperative promotional program for dealers?

	Total Companies	Yes	No	Uncertain	No Answer
	90	46	36	2	6
Will utility salesmen help dealers sell?	100%	51.1%	40.0%	2.2%	6.7%
Will utility fieldmen contact dealers to help promote sales?	90 100%	59 65.6%	24 26.7%	1 1.1%	6 6.6%
Will utility send direct mail pieces to consumers?	90 100%	55 61.1%	19 21.1%	6 6.7%	10 11.1%
Will utility do consumer newspaper advertising?	90 100%	67 74.4%	15 16.7%	3 3.3%	5 5.6%
Will utility have cooperative newspaper advertising plans for dealers	90 100%	35 38.9%	36 40.0%	11 12.2%	8 8.9%
Will utility have radio programs?	90 100%	36 40.0%	36 40.0%	12 13.3%	6 6.7%
Will utility use billboard advertising?	90 100%	34 37.8%	37 41.1%	8 8.9%	11 12.2%

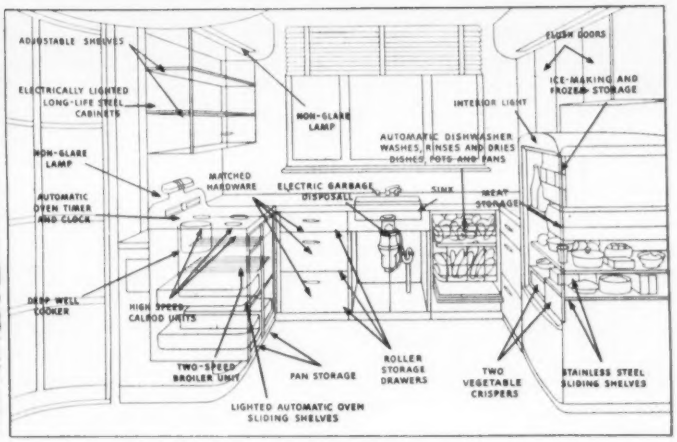
19V1 Sales Plans

Merchandising Policy: Of the 286 utilities included in this survey, 184 reported that they had merchandised one or more major appliances in 1941. In 19V1, 181 utilities definitely indicate that they will merchandise. The non-merchandising utilities totaled 90, leaving 15 utilities with no plans formulated either way. A breakdown by type of utility is shown in Chart 3.

The first question in this section reads as follows: "Do you expect to sell appliances aggressively?" The tabulation to this question is shown in Chart 4. It will be noted that in addition to the tabulation of this question on 19V1 sales plans, we also show a comparison of what happened in 1941.

"*Is it your plan to handle more or fewer brands in 19V1 than 1941?* No definite trend was revealed in answers to this question, as seen in Chart 5.

A modern electric kitchen as it will appear when finished



Cutaway of the same kitchen showing the electric features

Employment

The number of retail salesmen and home economists which utility companies expect to employ in the postwar period, compared to the number employed in 1941, provides an indication of the extent of activity in the appliance field in which they will engage. (See Chart 7.)

One of the promotion methods early adopted by a number of utility companies for ranges and water heaters, was the allowance for all, or part, of the wiring costs. The merit of this promotion method has been widely discussed. The tabulations in Chart 8 indicate the policy the utilities plan to follow in the postwar period in handling installation charges on ranges, water heaters and dishwashers.

CHART 8

Range installation allowance

		% to total
Utility will pay **part** of installation cost	52	18.2%
Utility will pay **all** of installation cost	14	4.9
No allowance on installation cost	158	55.2
Utility uncertain on postwar policy	39	13.6
No answer	23	8.1
	286	100.0%

Water heater installation allowance

		% to total
Utility will pay **part** of installation cost	46	16.1%
Utility will pay **all** of installation cost	15	5.2
No allowance on installation cost	143	50.0
Utility uncertain on postwar policy	38	13.3
No answer	44	15.4
	286	100.0%

Dishwasher installation allowance

		% to total
Utility will pay **part** of installation cost	13	4.6%
Utility will pay **all** of installation cost	3	1.0
No allowance on installation cost	193	67.5
Utility uncertain on postwar policy	42	14.7
No answer	35	12.2
	286	100.0%

Will dealers be extended the same plan?

		% to total
Yes	141	49.3%
No	2	.7
Uncertain	2	.7
No answer	141	49.3
	286	100.0%

New Products and Low Saturation Appliances

The rate of acceptance of electrical appliances by the consumer has been accelerated by the promotional efforts of the utility companies. The advertising and promotional plans of the utilities in the postwar period on comparatively new products of low saturation are presented in Chart 9.

The first use to which we put the foregoing information was to redistribute an analysis of it back to the utilities themselves. While our aim was not to direct their planning, many told us that trends indicated in the survey reopened questions they had prematurely thought settled.

The next use to which we put the information was as a basis for examination of the increase in use of certain types of appliances. Many of our present plans as to training aids necessary for dealers are direct outgrowths of information contained in that research project.

Last, but by no means least in importance, was the combining of the information with data from other research to guide us in our plans for product development. Mentioned earlier was the belief that this phase of our operations has been advanced over some of our *use-value* applications. A reason for that condition is that scientific study has always been the method of the engineering and manufacturing ends of our business, while this type of research is more lately being applied to our marketing.

Electricity has long enjoyed the reputation of performing magic deeds. We think that a new appliance presented to the public must be *better* and its uses *better* understood because it is

CHART 9

Do your 19V1 advertising and promotional plans include promotion of new products such as:

Household quick-freeze storage unit

		% to total
Yes	187	65.1%
No	48	16.8
Uncertain	19	6.6
No answer	32	11.2
	286	100.0%

Dishwashers

		% to total
Yes	168	58.8%
No	51	17.8
Uncertain	28	9.8
No Answer	39	13.6
	286	100.0%

Disposalls

		% to total
Yes	139	48.6%
No	62	21.7
Uncertain	36	12.6
No answer	49	17.1
	286	100.0%

Clothes dryers

		% to total
Yes	133	46.5%
No	63	22.0
Uncertain	34	11.9
No answer	56	19.6
	286	100.0%

Other appliances

		% to total
Yes	138	48.2%
No	40	14.0
Uncertain	30	10.5
No answer	78	27.3
	286	100.0%

electric. We are in business only to serve the American public, and our tool is the vast electric empire with its rich heritage of goodwill gained from freeing American women from labor. If we cannot add something to the comfort of the American home by producing a better piece of equipment, we do not deserve a high place in our industry. Electricity is surely going to remove the burden and disagreeable toil from all chores in the American home; it is going to take over duties and add comforts that are even now unthought of.

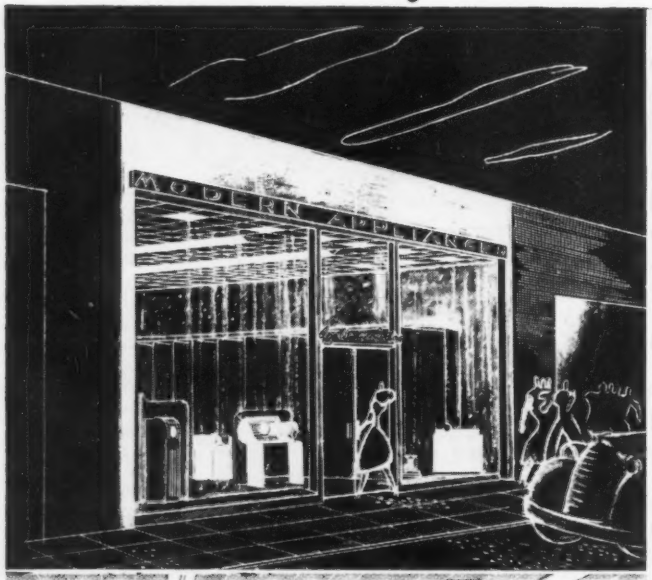
We must be aware of that potential in all of our dealings with our customers. That fact is what makes it so important that we embrace every opportunity to increase the goodwill that the industry enjoys because of past services. Our educational efforts must be shaped to bring us closer to the people we serve, and thus hasten the day when we will be of yet greater service.

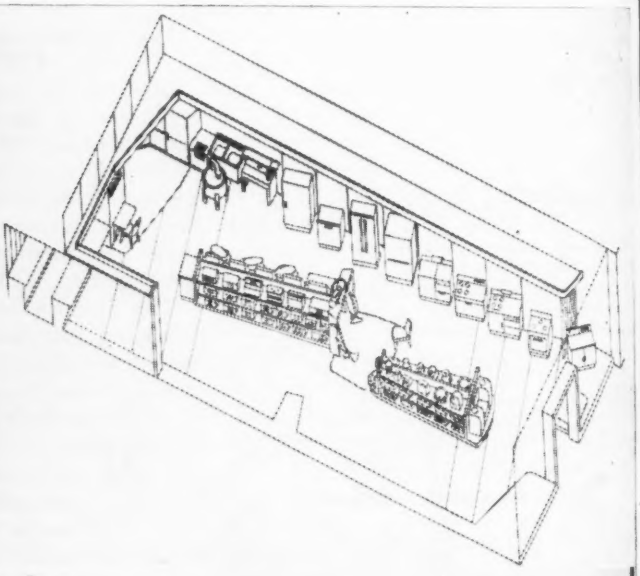
While the wartime period has suspended all normal manufacturing, and changed the expansion of the electric industry from domestic to production channels, it has been a period of great achievement. Central station distribution of electricity has met the war demands without once failing to supply the needed service. The opportunity to improve technical processes in manufacturer's plants where appliances are made, has been matched by an opportunity to study new applications in the home for appliances. One result of these studies will be to speed the day when the complete electric kitchen and home laundry will be standard equipment in all American homes.

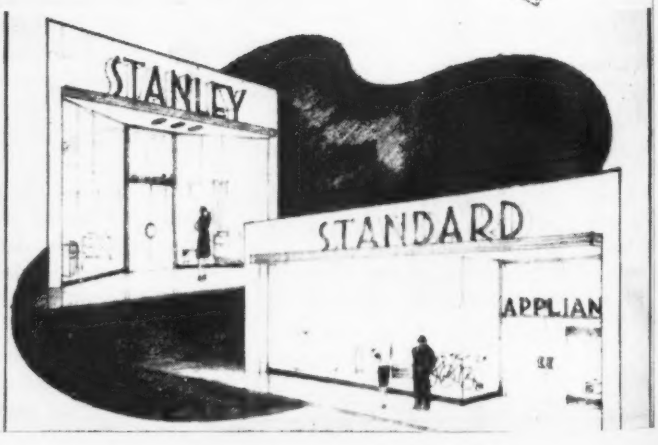
Electric commercial cookery has been given its greatest impetus by the wartime opportunity to serve in industrial plants where good food was an important factor in vital production, and in installations in Army and Navy properties. Electric equipment supplying food on submarines, and other marine craft where conditions are highly exacting, has brought new credit to the entire industry. Thousands of citizens now serving in the armed forces will return to their homes with knowledge that electricity has a new importance in their lives.

The members of the electric industry can see from many signs that a new day of vast opportunities and stern challenge faces them. No one doubts that they will greet the opportunity and meet the challenge. The weapon of greatest power in this new battle will be the power to spread knowledge to millions of Americans who will make greater use of electricity as they learn more of its power to work for them.

"Moderneering" is the name given to store design modernization by another manufacturer, Landers, Frary & Clark, in a program headed by Richard M. Bennett, design professor of Yale, and in which Sylvania Electric Products, Inc., National Electric Sign Assn., Pittsburgh Plate Glass Co., Congoleum-Nairn, Inc., Devoe-Reynolds Co., American Store Equipment & Construction Co., W. C. Heller & Co. and Celotex Corp. cooperate to advise dealers on plans. Some of the sketches, containing novel merchandising ideas from the portfolio, are illustrated here







ROY A. WEHE, assistant director of the Public Utilities Department of the California Railroad Commission, who here discusses the future of rural electrification, says that capital costs must be reduced if private utilities' rates are to meet future competition. Mr. Wehe speaks from a background of twenty-two years with the California Commission, seven of which were spent as chief of the gas and electric department, prior to accepting his present position in 1944.

FUTURE OF RURAL ELECTRIFICATION

ELECTRIC service to the farms, on a nation-wide basis, has shown remarkable development during the years just preceding the war and even during the latter period. Edison Electric Institute (EEI) statistics indicate that approximately 2,557,247 or 41.9% of the nation's farms as of the end of 1943 were connected to power lines, while five years earlier the percentage was but 26.2%, and back in 1934 only 11.8%—truly a remarkable gain. A very substantial part of this growth must be credited to the development under the Rural Electrical Administration (REA), which has come into being in this same ten-year period. While comparable figures are not available, the 1943 annual report of the latter does show that 1,087,801 "consumers" were connected to the REA systems, which were presumably mostly rural. How many of these are classed as farms and included in the EEI figures is not known to the writer. Of the total REA "consumers" but 4/10ths of 1% are given as in California, while rural customers served in this state are reported as 26% of the nation's total.

California ranks No. 1 in the nation, according to the EEI reports referred to, with a saturation of 96.3% of the state's farms served as of the end of 1943. The REA national averages classify California as No. 3 on the list with a percentage of 89.4.[1] In the latter classification the states of New Jersey and Rhode Island are No. 1 and 2, respectively. Our sister states of Oregon and Washington, on the north, likewise have a high rural development, and, according to the EEI report, serve 73.3 and 83.8% of their total farms, respectively.

Figures reported to the California Railroad Commission for the fiscal year ended Jan. 30, 1944, show that 139,669 farms were receiving central station electric service in the state. The division of service as between the different agencies was:

REA projects [2]	0.6%
Power and irrigation districts	9.7
Municipal systems	5.8
Privately owned utilities	83.9
	100.0%

Rural electric revenues in California for 1943 accounted for over 12% of the total. On the privately owned and operated systems, the proportion was in the neighborhood of 18 to 20%.

From this introductory resume it can be seen that rural service in California is important and has been highly developed. Where at least 90% of a state's farms now receive central station service, it naturally follows that the possibility of new customer connections is more limited than if there existed large unserved areas. However, there is always room for growth, and this will take place by still further reducing the unserved areas and by increasing the unit consumption.

All our utilities have plans to vigorously build new extensions to the remaining pockets in their territory without service on very favorable terms. A brief summary of such for the larger systems is given in the table above.

As the figures indicate, this is comparatively lean business, with but few customers per mile of line and the expected use is essentially that of general farm service with a minimum of agricultural pumping load. However, through this program, there will be

Postwar Expansion

Company	Number Customers Expected to Connect	Miles of Line Required	Customers per Mile of Line	Expected Annual Revenue
A	4,750	1,435	3.3	$400,000
B	1,500	450	3.3	180,000
C	500	150	3.3	30,000
D	1,220 [3]	160	7.6	50,000
	7,970	2,195	3.6	$660,000

[1] The differences in ranking no doubt are due in part to the definitions as to what constitutes a farm. Each year at the request of the REA, the California Railroad Commission sends out a questionnaire to all electric distributing agencies in the state to report the number of farms served. While the definition of a farm used is that of the U. S. Bureau of Census, defined as follows:

"A farm is any tract of land of three or more acres used mainly to produce agricultural products, or any place of three acres or less, where the owner or tenant devotes his entire time thereon to agriculture, or the annual value of agricultural products exceeds $250."

Yet we know that the reported farms served do not follow the definition precisely. For the fiscal year ended June 30, 1944, the reported farms served were 139,669 and the REA reduced this to 118,600—which is the basis of the 89.4% figure.

[2] The 0.6% for REA projects is somewhat low, as one of the irrigation districts that has received REA appropriations made no assignment to REA, but reported all farms served under, "Irrigation District."

[3] Includes some small communities.

brought to well over eight thousand rural families in the state the convenience, the comfort, and the higher productive capacity resulting from the use of central station electric service. It will likewise help fill the gap during the recovery period for loss in war load and by giving employment to many, both through the direct employment made necessary because of the new construction and indirectly from the impact of new customer purchases of appliances. When one realizes that a similar program will take place in practically every other state throughout the nation, the accumulative effect will be truly tremendous and far reaching in maintaining our economic level.

We have seen that the present high rural development in California has in part come from climatic conditions resulting in the need for irrigation pumping and, initially, fairly favorable production cost through hydroelectric development. (Cost from steam production is practically on a parity at $1 oil.) While these might be said to be the incentive, yet without an enlightened and energetic program for wide use at low rates and a favorable line extension policy, unquestionably a much lesser part of our development would have taken place.

Early Electrification History

Rural electrification has had such a profound influence upon the development of the State of California and of the nation as a whole that a brief historical review of rural electrification in California from the early beginnings to the present should prove of interest and of record value. The beginning of rural electric service, especially that used for irrigation pumping, goes back to the early 1900 period and before. In fact, it may be said that the electrical development in the hinterland has been coincident with the whole state's development. It likewise has been closely associated with the large hydroelectric expansion that has taken place in the state. To fully appreciate the significance of the forces which have actuated this situation, one must have in mind the natural setting of the state. Large sections of the great fertile valleys of the inland sections are semi-arid, having rainfall of from less than ten to fifteen or twenty inches a year, with most of the rain coming in the so-called winter period, leaving the long growing season with but little moisture. There are also years of drought when this average rainfall is much less. Such conditions have brought about highly developed systems of irrigation, both directly from wells with electric pumping and from ditch and canal systems, the latter being combinations of gravity flow supplied from rivers and by pumping.

Early records indicate that irrigation pumping, powered by electric motors, probably had its earliest use in about 1893 in southern California on the old Redlands Electric Light & Power Co., now part of the Southern California Edison Co. Ltd.[4] Somewhat similar developments did not take place in central and northern California until the 1898-1900 period. (These latter developments may be said to be wholly agricultural and in the rural areas.) During this latter period initial installations of electric pumping were made in the San Joaquin, Sacramento and the Marysville valley areas. The installation[5] on the Mt. Whitney Power and Electric Co. in the San Joaquin Valley had its power developed on the Kaweah River, and is now part of the Edison system, while the latter two areas are now served by the Pacific Gas and Electric system. In each of these early services, the source of supply was from newly completed hydroelectric plants. The hydro plants in themselves are of considerable historical interest for each involved "high" voltage transmission.[6]

The electric pumping installation, installed between Sacramento and Placerville, supplied from the recently constructed Folsom hydro plant, had 50- and 100-hp. motors. These operated at 2,200 volts and were supplied by three 50-kw. air-cooled transformers, and are said to have given successful operation from the very beginning.[7]

In the San Joaquin Valley, A. G. Wishon, a pioneer in rural electrifications, and at that time identified with the Mt. Whitney Power Co. and later the developer of the company that bore the name of the valley it serviced, was engaged in extending electric service. It was in part through his efforts and faith in the soundness of agricultural pumping that electric service to the rural user was in no small part due. He assisted, too, in the financing of the purchase of the pumping equipment.

As might be expected, the first power service was unmetered and sold at flat rates. These took different forms. In the San Joaquin Valley, Mr. Wishon first charged about $50 per horsepower year. It is understood this was developed by summing up the interest, depreciation charges on the investment, along with the operating and maintenance expenses, and dividing by the capacity of the generating plant. On the Sacramento Electric, Gas, and Railway Co., a predecessor to the present PG and E Co., graduated flat rates for ten-hour service were in effect around 1900.[8] One of the earliest

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[4] In an article by George P. Low in the *Journal of Electricity and Gas*, published in 1903, Mr. Low speaks of the incorporation of The Redlands Electric Light & Power Co. in 1892 and the building of the Mill Creek hydroelectric plant for the purpose of supplying the town of Redlands in which part of the service was used for pumping water in the town for irrigation purposes. It is understood that this was a 15-hp., 110-volt installation. By 1896 it is reported that several pumping installations were in use.

[5] There apparently is some difference in view as to these early agriculture electric pumping installations. In an article appearing in the December 27, 1913, issue of the *Journal of Electricity—Power and Gas*, this quotation is of interest:

"The idea [referring to the development on the Mt. Whitney system] of pumping the underground waters for irrigation was a conception originating with this project. Nowhere else had such a plan been considered feasible and the small amount of pumping in this district by gasoline or steam was inefficient and costly, and canal irrigation was absurdly inadequate. The business to which the company first catered was, therefore, largely pumping and a small amount of lighting. It may be said that electrical irrigation pumping was developed by this system and was well established for many years before it had been adopted in other parts of the state by other electric power companies."

[6] The Mill Creek-Redlands transmission voltage was initially 2,300 over approximately 7½ miles. The Folsom Plant, built in 1895, transmitted to Sacramento at 11,000 volts a distance of 22 miles.

The Kaweah power house No. 1 of Mt. Whitney Power and Electric Co., built in 1899, generated at 440 volts, which was stepped up to 34,600 volts for transmission to the Lindsay substation, a distance of about 21 miles.

[7] It is interesting to note (according to the account in *Pacific Service* of October, 1929, published by Pacific Gas and Electric Co.) that General Electric sent an engineer to the coast and as a result designed and built the three 50-kw. air-cooled transformers, but refused to give a guarantee. It is of record that the 100-hp. motor pulled 134 hp. when loaded, and one night after two years of satisfactory service the whole plant went up in smoke because of overheating the transformers. It was rebuilt and with larger sized oil-cooled transformers, and rendered service for many years.

[8]

Up to and including ½-hp. motor		$ 2.00 per month
From ½ to and including ¾-hp. motor		3.00 per month
From ¾ to and including 1-hp. motor		4.00 per month
From 1 to and including 2-hp. motor		7.50 per month
From 2 to and including 3-hp. motor		9.75 per month
From 3 to and including 4-hp. motor		11.00 per month
From 4 to and including 5-hp. motor		12.50 per month
Above 5-hp.	per hp.,	2.50 per month

For 24-hour service add $1 per hp. per month. Consumer furnishes transformers and line extensions.

metered tariffs was established by the California Gas & Electric Corp. in 1903.[9]

However, during this early period and up to about 1910, the agricultural power load in the state was small. In the next few years marked changes took place. In this period we find more intensive marketing methods,[10] the expansion of electric service generally, and the inauguration of state regulation (1911-12) as we know it today.

More Recent History

The period of 1912 to 1920 was one of marked growth in rural service. Immediately after the reorganization of the California Railroad Commission in 1912, with its broad new responsibilities and powers over privately operated utilities in the state, all rates for service were filed, accounting controls established, and service standards set up. However, it took time to bring about changes, and the early reports do not reveal a segregation between agricultural power load and other classes of power service.

It is apparent from a review of the early commission decisions that it, along with the utilities, appreciated the necessity of encouraging and promoting rural development through low rates and favorable rules and regulations governing extensions of service lines, and the advantages to be derived therefrom. It is to be noted also, the important role played by farm bureau organizations, notably the California Farm Bureau Federation, in development of rural electrification in the state.

In the early years, the large demands on the utilities came as a result of the winter lighting load. In the summer season the load was at a minimum. Because of the preponderance of hydroelectric development and the resulting high unit investment and corresponding high fixed charges, it was imperative to spread such costs over the maximum of sales.[11] Agricultural pumping load appeared to be a logical development as its use took place during the summer period. However, the rates that could be justified from the cold economics were not sufficiently low to enable our utilities to reach out and build the necessary transmission and distribution network required to render the rural service.

In this, one must visualize extensions not of a few poles in length, not even measured by a few miles, but lines running 10, 25, 50, and even a hundred miles long—requiring step-down substations at proper intervals and other necessary equipment. Such lines, because of the power load, are three-phase, with resulting higher costs, full metallic circuits, built to the high standards required under the Commission's General Order 96. Voltage conditions and continuity of service have always been of a high order. The customers' rural density, even today after all these years of development, is only about eight customers per mile of line on the Pacific Gas and Electric Co.'s system, if unincorporated towns and dense fringe areas adjacent to cities be excluded. On the other systems, including Edison, it is generally much lower.

Because of this, rates that did not carry their full costs were developed and made available. In 1923 the present form of the agricultural pumping rate was established on the PG and E system. A similar rate of the minimum charge form was fixed for the Southern California Edison Co. about the same time, and likewise for the smaller utilities.

In Decision No. 11457, typical of others, the California Railroad Commission, in discussing the agricultural situation, said in part:

> The rates for agricultural service were considered by all those who have submitted any evidence in the case relative to charges to various classes of service and it is conceded by them that at the present time this class of service does not, and should not bear its ratable share of the costs.

In the same decision, in reference to costs to serve, it had this to say:

> Evidence in this proceeding indicates, as has been many times stated, that the profit or return upon capital invested in the congested incorporated territories is greater than in the developed rural territories served. If this is not to be continued the extension and development of the rural and unincorporated territory will be stifled and such policy must ultimately work to the detriment of the more congested districts.

Today the rural farm load comes much nearer being self-supporting than formerly. While our commission still recognizes the original policy, growth and development in the rural areas have greatly improved the earnings from that service.

Rural Pumping Rates

The agricultural pumping rate is available only on an annual basis. It is generally a two-part rate,[12] the demand or service charge is based upon the customers' installed motor load and a blocked energy charge, graduating downward as the motor size and the consumption per horsepower increase.

Where there are wide differences in hours of pumping requirements, as in this state, a rate should differentiate between the occasional user and the one who pumps long hours over periods of several months.[13]

Line Extension Policy

As might be expected, the amount of electric line extension that the utility will build to secure added load has gone through a period of evolution.

[12] The typical agricultural pumping rate (Schedule P-3 of PG and E) is as follows:

Size of Installation	*Annual service charge per hp.*	*Energy charge in addition to the service charge rate per kwh. for consumptions per hp. per year of*		
		First 1,000 kwh.	*Next 1,000 kwh.*	*All over 2,000 kwh.*
2-4.9 hp.	$6.25*	1.6c	.8c	.7c
5-14.9 hp.	5.25	1.4	.8	.7
15-49.9 hp.	4.75	1.2	.8	.7
50-99.9 hp.	4.25	1.1	.8	.7
100-249.9 hp.	3.75	1.1	.8	.7
250-499.9 hp	3.75	1.05	.8	.7
500-999.9 hp.	3.60	1.00	.8	.7
1000-2499.9 hp.	3.30	1.00	.8	.7
2500 hp. and over	3.00	1.00	.8	.7

* In no case will the total annual service charge be less than $12.50 for single-phase service, nor less than $18.75 for three-phase service.

[9] The rate for 2 to 3 hp. started with 5 cents per kwh. with a terminal rate of 3 cents. The largest size motor load quoted started with a 2 cent rate and a terminal of 1¼ cent. The California Gas & Electric Corp. was also one of the major predecessors of PG and E.

[10] As an example, Pacific Gas and Electric Co. outfitted a traveling exhibit in the form of a railroad car fitted up with working models of electric motors and pumps and various other devices for the use of electric service on farms.

[11] Not only are the annual fixed charges high due to the hydro investment, but also there must be maintained stand-by steam generation as auxiliary, to provide for the low water months each year, as well as the severe cyclical variations between years as to hydroelectric output.

[13] It is to be expected that the farmer with the poor load factor will look with disfavor on this character of rate. In order to meet public demands an equivalent minimum charge form of rate is usually available wherein the energy rate carries the full charge, providing consumption is over the minimum established by the connected load.

In the early years there was lack of uniformity in practice. After the California Railroad Commission laid down the general basis for all rules and regulations governing the utilities' commercial relations with its customers in the early '20's, there has been fairly consistent practice. In later years and at the present time the amount of "free" extensions is stated in terms of the number of feet of line in reference to the service to be taken.[14]

Free footage lengths in the 1920-30 period averaged, or were predicated on, a gross revenue-capital relationship of about 3½ to 1. That has been extended to 5 to 1 and 8 to 1 and higher. During a limited postwar period a large number of new extensions are expected to be built where the initial investment in the extensions will be as much as 15 times the expected annual revenue. This program will just about complete the bringing of electric service to presently unserved marginal areas in the state.

Rural Pumping Service

While the earlier ten-year period showed remarkable growth, the records were not uniformly kept, nor was agricultural power service shown separately. For our purpose the changes taking place subsequent to 1920 will undoubtedly be sufficient. Some of the Southern California Edison figures that follow are believed to be of interest and illustrate the growth in this latter period.

Year	Kwh. (1,000's)	Revenue	Connected Hp.	Kwh. per Hp.	Rate
1920	...	...	135,707	...	...
1923	203,739	3,376	167,845	1210	1.67c
1926	325,846	4,379	222,006	1470	1.34c
1930	464,498	6,012	318,649	1470	1.29c
1943	366,130	4,809	294,853	1240	1.31c

It will be seen that there has been a steady growth until the year 1930. Sales and revenue in 1943 represent an improvement over the low reached in 1941, not shown. Rates have been at a very low level since the early '20's. the years of high use are years of low water and higher pumping requirements. In 1923 both agricultural sales and revenue were approximately 17% of the system, while in the last year shown it had dropped to about half that percentage. If Edison resale is excluded, agricultural service is about 10% of the total system.

On the Pacific Gas and Electric system, the growth (after adjusting for the larger systems that have been merged) shows the following figures for irrigation pumping.

Year	No. Customers	Hp. Connected	Kwh. Sales (1000's)	Revenue (1000's)	Avg. Rate
1923	23,360	261,190	234,519	4,368	1.85c
1932	35,600	519,900	500,416	7,715	1.55c
1943	37,370	617,938	706,125	9,377	1.33c

It will be observed that the average rate earned is higher than on Edison. This is principally due to the lower unit use. For instance, in 1923 each customer averaged 900 kwh. per horsepower-year, while in 1943 this had increased to about 1,140. The year 1943 was slightly on the wet side, so use was a little below normal. The need for maximum food production and better farm prices had the opposite tendency, so 1943 was not far below what might be viewed a long-term average.

During the same period agricultural revenues on the PG and E system have not quite maintained their place as to system totals. In 1923 such revenues were about 11.5%, while in 1943 they had fallen back to 9.8%. This has been brought about not because this service has not grown, as connected load and revenue have considerably more than doubled and sales about trebled, but because industrial power load has grown at an even greater rate.

The other utilities, such as the San Diego Gas & Electric, California Electric, and Coast Counties Gas & Electric, show nearly as large a growth and about the same average rate when adjusted for differences in use. This is borne out by the fact that the average for the state in 1943 was approximately 1.33 cents per kwh.

Possibly too much emphasis has been placed on the irrigation service. If so, it has not been done with the intention to minimize electric service for the more usual uses such as residential, commercial, and general power. These rural services are now of equal or greater importance from the standpoint of utility revenue. In 1943, for instance, over 16 million dollars, or about 9.5% of the total revenue from six[15] of the state's largest privately operated utilities, was received from this source. When this is added to the pumping load, total gross receipts are in excess of 19% of system's electric revenue.

It is likely more than of passing interest to state that the rural residential customers earned, on the average, somewhat less than 2¾c, while those classified as urban paid about 3 1/3c per kwh. Lest a wrong impression be gained, this lower rural earned rate is due entirely to the great difference in annual customer usage, for, as a matter of fact, the rural rates are actually higher for like usages. The rural residential users can be credited with about 1,940 kwh. a year, while their city cousins' use is about 960, a differential in favor of the rural customer of 2 to 1.[16] The future should witness a substantial increase in annual use, both within the cities and the rural areas.

Rural electric service in California will continue to grow, and at ever lowering rates as usage increases. However, the industry must realize that the problems presented are much farther reaching than are commonly encountered in the building of load in marketing. Mere increase in usage will not in itself be sufficient to bring the more extensive service and lower rates that the keen competition in the future will demand. It will call upon management to scrutinize all costs, both fixed and operating, in a way that such costs have never been re-

[14] Typical free footage allowances are as follows:

For each lighting customer	200 ft.
For each refrigerator installation	200 ft.
For each kw. of connected heating	125 ft.
For each hp. of connected power load in installations aggregating (a) less than 5 hp	150 ft.
(b) more than 5 hp	200 ft.

For extensions made beyond the "free" length, an advance at the rate of 25 cents a foot is required which is refundable at the rate of 10% of the annual billing and, in addition, a designated dollar refund for new meters served off the extension, according to the character of the new load, is provided.

[15] The six utilities included are: PG and E, Southern California Edison, San Diego Gas & Electric, California Electric Power, California Oregon Power, and Coast Counties Gas & Electric Co.

[16] It should be pointed out that there is not complete uniformity in classification as between rural and urban, so some of the figures are only approximate. There is included in rural not only "strictly rural" but, in part, unincorporated communities and fringe areas adjacent to cities.

viewed before. Happily it appears that in so far as California utilities are concerned the cost for depreciation will continue to decline, and likewise the present heavy tax burden should be substantially reduced to all. This will give some relief; however, ways and means must be found to reduce the over-all system investment per unit of load served, as well as the actual carrying charges. This is a program that will require planning, courage, and even self-denial. There is no question but that there is a big job to be done, and when we look back and review what appeared to be many difficult and even almost insurmountable tasks, then, indeed, there is reason and assurance that private industry under state regulation will be fully capable of meeting this challenge.

Power companies of the West will go all out to serve that "last remaining farm" in a 6,560-mile extension program that will cost $8,493,000 and serve 20,570 farms. Electrical West here contributes a round-table discussion on rural line practice via remote control to "the convention that wasn't held." Distribution engineers bring out magnitude of the undertaking as well as design and construction practices to be employed in a far-reaching industry program embracing

ALL-OUT RURAL EXPANSION

NEARLY a year's steady employment for a thousand men is embraced in the two-year postwar rural line construction program of twelve large Western power companies. Plans call for building 6,560 miles of line to serve 20,570 farms at an estimated construction cost of $8,493,000. Expected annual revenue is $1,126,068. This is for only *twelve* of the largest systems. Had it been possible to survey *all* of the privately operated power companies of the West, the figures would have been increased by not less than 20%.

This means fulfillment of the remotely situated farmer's dreams. With completion of this Western private power industry program, central station service to farms in the eleven Western states will approach 100%. The program is one of the power company's contributions to postwar employment. It represents 2,067,000 man-hours of direct construction labor, to say nothing of the labor and materials that will be required to wire and appliance these more than twenty thousand farms.

With such a comprehensive program, the question foremost in the minds of power company engineers is, "How can rural line costs be reduced?" Or the question might be stated, "How can rural lines be designed and built to give lowest possible cost consistent with good service to reach the comparatively few unserved rural customers of the West?"

Every distribution engineer has weighed his particular problem and has carefully analyzed all the elements of cost that enter into rural lines. Each has ferreted out certain elements of cost upon which greatest emphasis will be placed in building future rural lines. This is clearly brought out by the answers to a questionnaire sent out by ELECTRICAL WEST to twelve of the larger power companies in the eleven Western states.

Highlights of Private Utilities Rural Expansion Program

Miles of line	6,560
Farms to be served	20,570
Total cost, lines only	$8,493,000
Expected annual revenue	$1,126,068
Man-days labor required	258,400
Man-hours labor required	2,067,200
Avg. No. customers per mile	3.1
Avg. cost per mile of line	$1,292
Avg. annual revenue per customer	$61.30
Avg. annual revenue per mi. of line	$192

Answers to these questions brought out some very interesting information. They showed a remarkable unanimity in the thinking, planning and philosophy of the engineers, and indicated that all had arrived at about the same answers to the many problems involved. On the matter of cost, the answer seems to be fewer poles by use of longer spans and high-strength conductors, plus careful planning, competent supervision and greater use of labor-saving equipment.

To sum up results of this feature of the program of "the convention that wasn't held", each question will be stated, followed by a summary, and in many cases by quoting some of the specific comments. Answers to the first five questions having to do with miles of line, cost, number of customers, revenue and man-days of labor are given in the accompanying box.

The next question was:

QUESTION: Do you propose to build these lines yourself, or will you contract the work, Probably you have not definitely decided this point, but how do you feel about contracting this work and what are the factors that will influence your decision?

FOUR companies, representing 1,940 miles of line, said definitely they would build their own lines. Three, who will build 3,150 miles, answered that they probably will do the work with their own forces, but stated consideration would be given to contracting. The remaining four companies, with 1,470 miles of line, said either they will contract or favor contracting. A fair appraisal of answers would seem to indicate that about 50% of the total of 6,560 miles of line will be contracted. Factors which will influence decisions, aside from cost, are that piecemeal construction, which will be followed by several companies, does

not lend itself to contracting; and some feel that better work will result from utilizing their own crews. Size of projects and availability of manpower, also will be determining factors.

QUESTION: In comparing contract bids with your own estimates, will you include in your own costs, stores, engineering and overhead expenses? What do you consider a fair basis of comparison?

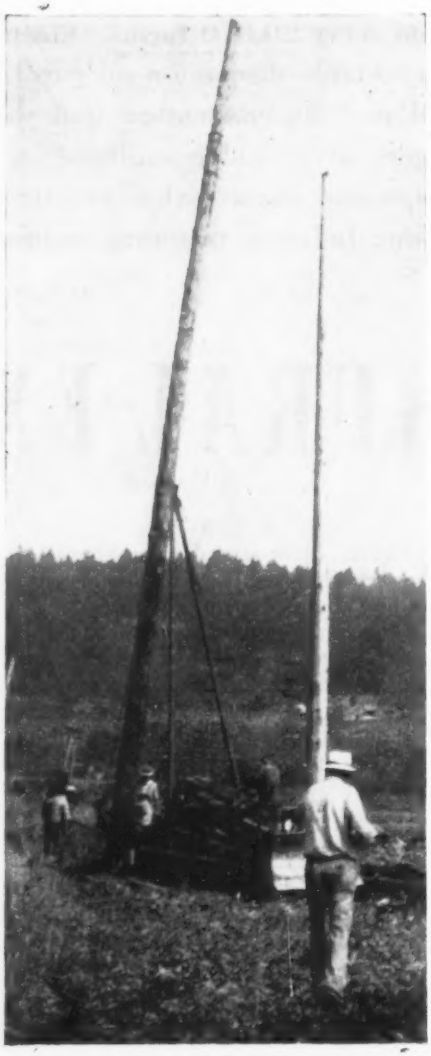
ALMOST without exception the utilities will include their stores, engineering and overhead expense in comparing estimates with contractor's bids. However, there were exceptions where utilities do not include engineering expense in their own figures for purposes of comparison as they state that as much or more engineering is required when lines are contracted. Several add a percentage to contractor's bids for comparison. Typical is one company's policy: "Twenty per cent added to our cost of material and labor to cover stores and overhead. Ten per cent is added to contractor's bid. The difference between our labor and material cost plus 20% and contractor's bid plus 10% should in general exceed a 5% saving for us." Another reply reads, "A fair comparison would be to add to the contractor's costs the company's costs of inspection, engineering and supervision, the total of which would be compared to the company's over-all cost of construction." Several other replies along the same lines would indicate that the generally accepted method of comparison will be to add a percentage to contractor's bids that will fairly represent certain items of overhead that the utility must bear even though jobs are contracted.

QUESTION: What do you estimate your minimum and maximum cost per mile will run for the various types of construction you will use for different conditions?

COSTS ran the gamut from a minimum of $475 per mile to a maximum of $3,000. These naturally cover widely varying conditions. The figure of $475 would build a line using class 6 poles, and steel wire with 600 ft. ruling spans. The figure of $3,000 covers three-phase copper lines in heavy loading, hilly and mountain area. Three companies, with about a thousand miles of line, reported cost range of $800 to $1,200. Seven, who will build 3,190 miles of line, fell in the cost range of $800 to $1,600 per mile. Average for the total of 6,560 miles of line is $1,292 per mile, exclusive of transformers and services. If 2,000 miles of line in the heaviest loading areas were eliminated, the average cost for the remaining 4,560 miles would be about an even $1,100 per mile.

QUESTION: Will you undertake entire projects, or will lines be built piecemeal?

SEVERAL reported that entire projects would be undertaken, but for the most part construction will be on a piecemeal basis because of the large number of extensions involved.



Bulldozer with derrick not only sets poles but has proved a great labor saver for Puget Sound Power & Light Co. in clearing rights-of-way for rural line extensions. Labor-saving machinery offers one of the greatest opportunities to reduce rural line construction costs, say the distribution engineers

QUESTION: What voltage or voltages do you favor for rural lines?

THE preferred voltage is in the 12-kv. class. In fact, it will be almost universal. A few will operate delta, but the majority will be 7.2/12.5 kv.-Y.

QUESTION: What type of transformers will be used, i.e., CSP, some of its variations, or ordinary distribution transformers?

SIX companies representing 2,670 miles of line report they will use CSP transformers or some of its variations in lightning areas. One of the six with 500 miles of line will use CSP on all 11-kv. lines. This indicates a growing favor for the complete-self-protected type of transformer, but several large properties will use ordinary transformers and spill-gap lightning protection instead.

QUESTION: What type of conductor will you favor?

ACSR and Copperweld are decidedly the preferred conductors. One would judge from the answers that these will comprise a large percentage of the total mileage. Steel, Amerductor and bare and stranded copper also will be used, the former for extremely low load density areas and the latter in the heavier loading districts.

QUESTION: Will you use special fault protection of any kind?

ONE large company reports that it will possibly use service restorers; another large utility will use special protection in foothill and mountain areas; three will use re-closing breakers, one of which will also use some three-shot fuses; one will use coordinated fusing and spillgaps, while the remaining six companies, with 1,985 miles of line, will use no special protection.

QUESTION: Are you revising your rural line design or standards, and what are the important features of design as regards span lengths, conductor, class of poles and treatment, crossarms, ridge pins, brackets, hardware, etc.?

SEVERAL answers will be quoted: "Maximum span for light loading, 800 ft. Maximum span on 5-ft. crossarm, 660 ft. Copperweld 8A and 6A. Class 4 and 5 poles, W.R.C. butt treated and southern pine T.F.L. Rack construction on secondaries. Through-bolt guying with guying-eyes." "We have revised our rural line standard to include a low load density type of line with 600-ft. ruling span, steel conductor, class 6 butt treated poles, 5 ft. crossarms." "Expect to use REA design with some modifications. 300-ft. spans for No. 6 bare hard drawn copper and 400-ft. spans for No. 4 ACSR. Class 3 creosote butt-treated cedar poles, 3¾ x 4¾ in. x 8 ft. fir crossarms, metal ridge pin, upset brackets and standard hardware." "We will be using the same construction as has been used for several years, namely:

approximately 500-ft. spans; high-strength three-strand conductors, mostly steel but some Amerductor and Copperweld; 35-ft. creosote butt-treated pine poles; ride pins and brackets for 7.2-kv. single-phase branches, crossarms for three-phase lines; neutral multi-grounded." "Our present standards will be used. There have been no new developments in the past few years that would justify any major change."

QUESTION: Will your philosophy be to build for minimum first cost, or to use a better grade of construction in order to attain longer life and lower maintenance? How far will you go in lowering your standards of service to rural areas for the sake of reducing first cost?

ONE company's reply to these questions pretty well sums up the philosophy of all in respect to standards of construction and character of service. "High standards of construction will be used throughout so that long life and the minimum amount of operating expense may be achieved. Our experience indicates that there is no economy in building lines that give sub-standard service in order to make savings on initial investment. We feel that the most economy is in furnishing our rural customers with high-grade service both in regards to continuity and voltage."

QUESTION: In attacking the problem of reducing rural line costs, can you put your finger on any one or more elements of cost that offer greatest possibilities of reducing costs?

THIS obviously was the $64 question. All replies hit squarely in the target area. One engineer's analysis of the elements of increased cost focuses attention on the vulnerable points of attack. "A rapid comparison made of line costs in the years 1935 and 1945, show the following, which of course are approximate:

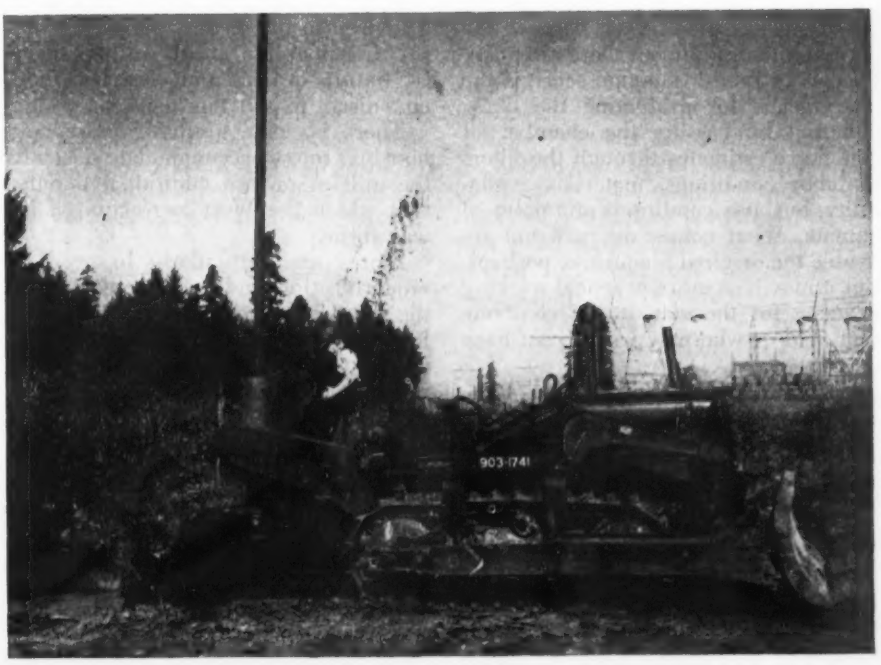
Poles	46% increase
Crossarms	116% increase
Wire	practically no change
Meters	practically no change
Transformers	practically no change
Labor	40% increase

Since poles and labor are the largest items of cost it is apparent that thought must be given to the most judicious use of each in order to reduce rural line costs."

Another states, "Costs of lines are affected more by the quantities of materials used than by the types used. . . . Each item omitted reduces costs; every pole requires crossarms, pins, insulators, braces, nuts, bolts, and the labor of erection and assembly." Others: "Labor offers the greatest possibility of reducing costs. We feel that well organized construction crews and proper planning, and the automotive equipment necessary to do this type of work, will result in minimum costs." "Undoubtedly the problem of reducing costs may be met to some extent by using longer spans and more simple pole-top construction. . . . Undoubtedly labor costs, which are of the utmost importance, may be slightly reduced in case of contracting lines or faster methods of transporting labor from shop to job." "Use of simplified pole-top construction, now restricted in certain respects, would materially reduce first costs." "The elements of cost reduction with the most promise are the use of longer spans with high-strength wire, cheaper type of poles, and mechanized equipment for saving labor." "Only to the extent of making longer spans where possible, by use of ACSR or steel conductor." "Saving in labor will have more effect than changes in types of construction and materials." "It is proposed to reduce rural line cost by smart supervision." "Poles are the greatest single item of cost. Poles should be kept to a minimum by using high-strength conductors and long-span construction." "The only thing the utility can do in this connection is to adopt construction methods that will reduce labor costs and diligently work to reduce materials and equipment costs." "The largest field for the reduction of cost in rural lines lies definitely in a reduction in the labor cost required to build them. This can best be brought about by a well-organized crew having proper mechanized equipment to carry the job through quickly. This should include power digging machines, air compressors for rock holes, a small a-c generating set of 1½ to 3 kw. mounted on a truck to furnish power for electric drills for framing poles, etc."

BULLDOZER-MOUNTED DIGGER SPEEDS 230-KV. LINE CONSTRUCTION

POLE hole digger mounted on a crawler type tractor bores 36 in. diameter holes 11 ft. 8 in. deep. This rugged piece of equipment built in shops of the Bonneville Power Administration was used in building the recent Covington-Coulee wood pole, 230-kv. transmission line. Equipment is mounted on an H. D. 10 Allis-Chalmers crawler type tractor driven by a General Motors two-cycle diesel engine. The blade proved invaluable in clearing pole-hole locations and also provides rigidity when lowered for digging and pole setting. A removable scarifier tooth is provided to attach to the auger bit and has proved of value when working in cemented gravel or similar ground. All controls are within reach of a conveniently located platform and seat to permit one-man operation. Sufficient power and mechanical features have been built into the machine to rotate a 48-in. diameter auger bit successfully.



Construction is one of the major industries of the country. During the war it has strained itself to produce the facilities for war. Its record of achievement has been beyond imagining for military necessity prevented publicity about it. What is its future? This is a question that affects the electrical industry in many phases. Most concerned, of course, are the electrical contractor, the electrical workman, the electrical wholesaler. From real self interest they ask in chorus

WHAT'S AHEAD FOR CONTRACTORS

GOOD old construction. It is supposed to take up all the shock again. If manufacture fails to re-employ everybody, construction is supposed to be there with life rafts to keep all from sinking. If private construction can't cut it by itself, big government public works are to be whipped up in a jiffy to feed the work hungry populace.

It makes nice reading, but will it really be like that? What is the prospect for construction, particularly electrical construction? What does it promise to electrical contractors, wholesalers and manufacturers of supplies, and likewise dealers and finally the serving utilities?

Estimates and statistics are so big and so numerous and so often conflicting that it may be just as well to forget them for the time being and consider the subject from the standpoint of common sense. Most of the statistics are based on estimated needs. Between the need and the fulfillment there are many hurdles to jump. Common sense is the only means for evaluating the likely potential by passing the chamber of commerce estimates through the filters of labor conditions, materials availability, business conditions and political climate. What comes out will not resemble the original blueprints, perhaps. But it may be a more practical working drawing for the man in the construction field or who may wish to get back into it.

Such an approach will be made here, with the prospect treated from the standpoints of the need, the obstacles, the intangibles and, if one is possible, the answer. In much of this review the contractor will find reflected his own thoughts and conclusions, for contractors as a rule are realistic reasoners. If some slant, some new thought, some tip which may be followed to advantage is to be found in this summary, it will pay him to consider it carefully.

The Need

Americans have never before gone so long without being able to do some remodeling and changing. What little remodeling that has been done has been to make more housing facilities available, and this has not been with good materials, adequate wiring or any real improvements to the property. If anything it has downrated the property, broken zoning standards, cheapened the neighborhood. All of these conversion jobs are in need of more wiring. The need is there. Can it be sold?

Even the houses on which nothing was done have run down at the heel and need refinishing. With such freshening there should be considerable done in most cases to improve the wiring, to install new lighting fixtures, to add outlets, to install electric kitchens. The need in this field is almost universal. Considerable effort will be made by fixture dealers and electrical merchandisers to sell this market.

There is acute need for more new housing, too, to accommodate decently the million or two additional population which the West has acquired by war shifts.

Stores are particularly in need of modernization and improvements. On the short end of the essential lists they have had very little done in the way of new fixtures, new arrangements. They will become an immediate and an eager market for modern lighting, for new light sources and lighting effects.

Office buildings in the major cities of the West have been filled to overflowing by government agencies and military offices or by expanded office staffs of war material producers, engineering staffs, and the like. In many of these, under priority, extensive lighting installations have been made, usually in fluorescent. After the commercial type fixtures ran short, the strictly functional industrial types were installed. Many of the latter are of substitute materials for reflectors and housings, too.

While the former, with commercial type fixtures, may become the more or less permanent lighting for many office buildings, the industrial type will offer replacement possibilities. With the vacating of many office buildings, competition between them for new tenants among business concerns can result in considerable remodeling and relighting.

Industries have taken full advantage of the opportunities offered them for equipping with modern tools and modern lighting during the time they have carried war production contracts. In many cases, even small local factories have operated more than a day shift, with the necessity for good lighting for night operations. High priority has made it possible to obtain lighting equipment if they asked for it. Therefore it would appear that the industrial lighting market may be rather quiet for some time.

Changeover from war production to civilian work will entail changes in machines, production lines, controls and wiring. This field will be a potential producer of wiring business.

Utilities — both business managed and governmental — during the war have relied oftener upon electrical contractors for the building of power lines, substations and power stations than was the custom in the past. All utilities plan extensive improvements to their distribution systems as soon as materials are available and manpower to do it can be obtained. Rural line extensions (see p. 107) will be run everywhere there is a possible chance of their paying out, to bring electric service to farm customers not now reached.

How much of this construction work

the contractors can do for the utility companies, the REAs, the power administrations, will depend largely upon how good a case they make for themselves, either individually or by associations. In their favor is the fact that under SEC separation from holding companies and reorganizations, the holding company owned engineering and construction companies have been broken up or put on a strictly competitive basis. The necessity to bring investment costs down to the rock bottom offers contractors an opportunity to prove that they can erect lines at less cost than company crews because of more efficient handling of the job.

Another factor in favor of the electrical contractor is that, if he contracts to do the work, he handles all the labor and removes from the utility the burden of overhead, represented in reports, social security and withholding taxes, compensation insurance, and compliance with complex labor regulations.

Even in the fields of maintenance and repairs, even trouble shooting, there is a possibility for contractors to prove that they can organize the crews and operate them more efficiently and at less expense than the company, the REA or the light and power department of municipal or federal power administrations can do so. An efficient motor repair shop in southern California has proved it to one large utility as far as rewinding transformers and similar equipment is concerned.

So-called public works construction, being designed now for postwar construction as a cushion, or perhaps a better word is sponge, to soak up any likely unemployment, falls into several classes. All governmental institutions that have yearned for more facilities are seizing upon this opportunity to plot projects for which the money may come from government appropriations. At the local level, there are schools, hospitals, playgrounds, sewage plants, police radio systems. State-wide there are college additions, state institution buildings, highways. The federal government, too, has a roll of plans the size of the capitol for propects all over the country.

With strong lobbies and adroit pressure groups, every industry but the electrical seems to be aiming to channel this public works construction money their way. Either modesty or fear of being thought commercial has kept the electrical group from making more than a murmur to cut in on this type of business. An example is the hopeful attempt to get an appropriation from the California legislature to light some of the state highways and thus save lives. After a few lateral passes behind the lines the ball carrier grounded the ball and so nothing was accomplished by even an earnest group of the industry which made an auspicious start in this much needed direction.

This leads naturally into a consideration of some of the other obstacles to a full realization of the full potential of the electrical construction market. The market is there, but whether it is realized or not will depend upon the extent to which these obstacles are removed or hurdled. They are both tangible and intangible. Consider them for a moment.

The Obstacles

First among the tangible or real obstacles is the materials situation. What is its status?

At this moment what is said today is obsolete tomorrow. The War Production Board limitation orders are dropping off like leaves from an autumn tree. But this does not mean that materials are available. It means that, if you can get them, it is all right to use them. But the priority user still has first crack at them. War production has not ceased by a long way. It still has first call on materials. If there is any left, it can be used to convert into civilian uses.

Take fluorescent fixtures as an example. L-78 has been revoked. But fluorescent fixtures take a ballast. The ballast requires copper wire and iron. The demand on winding facilities for transformers of this size is still channeled toward supplying military needs for special transformers and coils for field radios and radar equipment. Therefore, although fluorescent fixtures are free of restrictions as to who may buy and install, the supply of them will still be short until more ballasts can be made.

This is typical of the situation on other building materials. Lumber is still very short. Housing cannot start until lumber is more plentiful. Hardware, plumbing, plywood and several other materials necessary both for house building and for construction and remodeling generally, are still, and will continue to be, short in supply for several months. One favorable factor as far as wiring supplies are concerned is that the manufacturers of these did not stop manufacture to change over into something completely different. They kept making wiring supplies all during the war, but all of these were being channeled to war projects. There will be no reconversion delay. Stocks of such materials, though low in wholesalers' inventory right now, will be first to be replenished.

Mass housing, like this near Ogden, was built with a minimum of wiring and, if continued use is to be made, should be rewired for more adequacy

Labor presents the most unpredictable and the most real obstacle, if some of the observable trends of today continue. The situation is extremely complex and highly charged. During most of the war the main difficulty was labor supply. There were never enough electricians available. The decline in demand for electricians has begun, and with it have begun troubles arising out of unpopular adjustments that must sooner or later be made.

Prewar wage scales of electrical workers were based upon interrupted construction employment which often reduced the total working days per year. Consequently they were high. Before the freeze was put on wages during the war in Europe, wage scales were advanced still higher. For the

past three years of labor shortage, employment has been almost continuous and there was lots of overtime. The take-home pay each week was higher than electricians had ever known. The yearly income reached new highs.

Pay roll deduction taxes took the first toll of these high wages. Pressure began then for wage increases to balance tax deductions but the "little steel formula" held. Now throughout the West overtures are being made for new agreements at higher hourly pay, plus the request for vacations with pay. To finance such vacations, it is proposed that a percentage be paid by employers to the union, which would accumulate as a fund to provide pay during the vacations.

While it is laudable to endeavor to maintain a high standard of living and high income and to provide the social benefit of a vacation, the question arises whether the traffic will bear it. The percentage of total cost of a construction job going to labor used to be 40%. Lately, with poor efficiency and inexperience, labor cost has almost doubled. Many contractors complain that estimates of man-hours to do any given job must now be double what they used to be to be near correct. It would seem that, until labor efficiency is restored and even improved upon over the past, this cost would work against the creating of much new construction business.

There are some cities in the West where remodeling and modernization is crying to be done but in which labor costs are so high and union restrictions so severe that property owners just do not have anything done that is not absolutely necessary. In such places, labor sits in the hiring hall without work and the town goes into decay. There is a law of diminishing returns. The buyer can only afford to pay so much for a job. Beyond that he goes without. When he goes without, nobody works or earns.

Some honest fact-facing by both contractors and unions is urgently needed in the negotiations concerning these demands. Although promulgated strongly by both the National Electrical Contractors Assn. and the International Brotherhood of Electrical Workers through a joint postwar planning committee, the annual wage idea has not found belief that it can be made workable for the construction industry by either Western contractors or union officers.

Another factor entering the labor picture has come with reduction in war plant employment. The CIO leadership, looking for a place to reemploy its members whose war jobs have ceased to be, and hearing that construction is to take up the slump, naturally turns to the construction industry as a potential source of work. It is now busy organizing its own building trades unions and thus invading a field once held exclusively by AF of L unions. All of those with any construction skills are being moved into these unions and the plan calls for the establishment of training schools for others who want to work in the construction field.

Because of its broad industry-wide type of organization, instead of individual crafts, CIO may offer to general contractors some type of blanket contract which would be attractive to them and would eliminate subcontractors, such as electrical contractors. The situation also holds the potential of jurisdictional fights, which will not do construction much good. Owners of property might hesitate to build if they feared being involved in the cross fire of union warfare.

Returning veterans will swell the lists of those who want to work in construction. Preferences expressed by soldiers and sailors surveyed so far to determine what their ideas are, indicate some 40% hope to go into construction work. The program for apprenticeship training for veterans is moving quickly to give these men training and employment too, if possible, under the GI Bill, with the cooperation of trade schools, unions and employers.

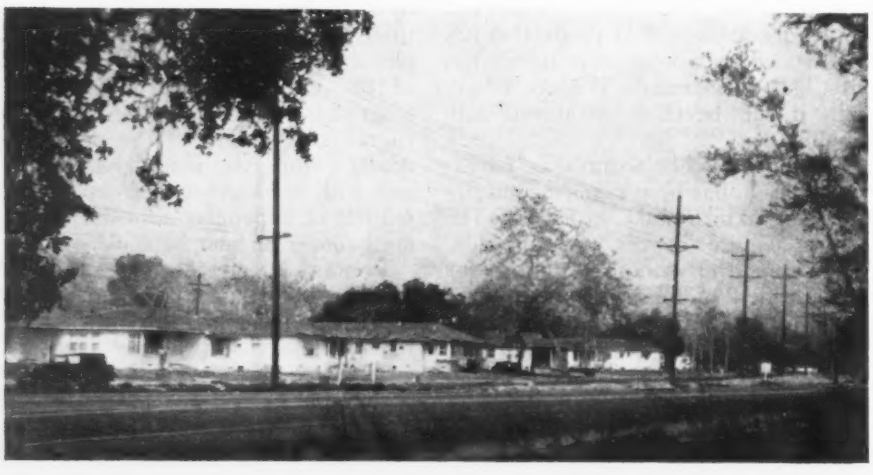
One of the unsolved questions is that of adjusting labor to the prefabricated house developments that are taking place. While prefabricators hope that, by agreements with headquarters of various unions that they will employ men of their crafts in the prefabrication, the matter can be handled satisfactorily, the shadow of the court decision in the IBEW No. 3, New York City vs electrical manufacturers case still lingers. Any local union, despite a union label on the prefab house, could demand that it be dismantled and re-erected by local labor. All the advantages of modern mass production would be wiped out should that occur.

The labor situation need not get explosive if leaders, both of the unions and contractors, work out these problems together. One factor in favor of such a possibility is that friendly relationships between electrical contractors and the union have been built up by years of negotiations. In this respect, friendly relations are farther advanced than in many industries, where collective bargaining is relatively a new thing and both parties approach it with suspicion and distrust. Indeed, in the electrical construction field, it is often union leadership that is more anxious for contractors to make money than the contractors themselves seem to be because of sharp competition.

Building codes are often charged with being obstacles to construction business, and in some cases this may be so. Many purely restrictive codes, however, have had to give way during the war when special materials required by them have been unavailable. On the whole, however, building codes are mainly for the genuine protection of the property owner. Shoddy construction is not apparent at first; but before the mortgage is paid off it becomes glaring. Poorly built, poorly wired houses or business building deteriorate fast and degrade their surroundings. Far too much war-built housing will do that as it is, without permitting any more of it to be perpetrated.

Most building and electrical codes are either in process of revision or soon will be, for the new products, the

Attractive to the eye but electrically antiquated when built are many FHA financed homes built during the war. By ingenious placing of outlets back to back, Mactolf-Doll Electric, Glendale, managed to give these homes the utmost adequacy the restrictions would allow, but they still need more



Many contractors have greatly expanded their organizations, increased their equipment, expanded their warehousing facilities to do big war jobs. Electric Construction Co., Fresno, moved away from downtown, too

new techniques developed in the accelerated scientific developments for war now need to be incorporated in these codes.

Government regulations still remain as obstacles to a fast resumption of building, although they are beginning to drop off fast now. Each mail from Washington brings news of more limitation orders revoked. At the end of last month L-41 had not yet been revoked or revised, due chiefly to the lumber situation.

Price controls, however, can be expected to remain until after the end of the war with Japan. MPR-251, covering construction, however, has been simplified recently. MPR-165 and several others covering repair services have been bunched together. The contractor having a repair shop will do well to keep all necessary records for a long time. There is no telling but that a postwar work-making project for clerks and accountants might be cooked up to review and recheck all the wartime accounts to see that WLB and OPA rules were obeyed. It is well to remember that President Truman made his name checking into war production costs and wastes.

The Intangibles

Greatest intangible of all is the question as to when the war in Japan will be over. The optimists say a year or less, but they said that in 1942. The pessimists point to Japan's talk of a hundred years of war. The realists remember setbacks such as that last Christmas, in Belgium, and realize that Japanese fight to the last Jap.

Length of the war will determine the drain on materials and, consequently, the rate of reconversion to peacetime pursuits such as construction. Length of the war will determine the quality of materials that can be used. After the minimum number of units to house the increased population of the West has been provided from available and minimum materials, the market may wait. It is going to be interesting, this fall, to see how avidly the refrigerators and washing machines which will appear on the market are brought up. This will give some index of house building demand by private buyers.

Competition with other industries for the builders' dollars will be keen. There is no gauging how this will affect the market for new construction. In the home building field, the automobile may be a real threat. In commercial and office building wiring and lighting, competition will stimulate new jobs for all merchants and office building owners will be in competition for business again. The new lighting, the new wiring, will be an asset to them.

Available money to spend has been talked about very glibly. Running up a total of war bond purchases, wages paid and other figures of wartime, the answer seems to be a tremendous potential buying power. But since this is a common sense view of the construction field, it is well to apply common sense to these Amos and Andy figures.

First, while they are investments and redeemable, it is well to appreciate that war bonds are a claim against *future* taxes. If there should be too fast a rate of cashing in of war bonds, it is quite likely that the Treasury Department would be forced to call a halt. After all, the money was borrowed from us to pay for the war. The money has been *spent* on the war. The Treasury cannot redeem the bonds until it refills the treasury with tax money.

This leads to two conclusions. First, that war bond money should not be counted as negotiable legal tender with which to purchase wiring and construction. Second, the rate of taxes for many years ahead will have to be high to make good on these bonds when due. This is bound to leave little collateral for financing much private building. Building by private owners will have to be done out of cash reserves or new borrowings from the banks or loan companies, not war bonds.

The tax load that every person necessarily must carry will continue to be heavy. This will put brakes on spending. Reduction of the work week to straight time, without overtime or bonus rates for night shifts, will also reduce buying power. Indeed the agitation for wage increases stems directly from the reduced take-home pay and the deductions for taxes which are being felt now. Efforts to bargain for the full take-home total previously provided by overtime are being urged in every union meeting these days.

Probably the toughest obstacle contractors have to hurdle is that of habit. This includes the habit of construction on the site instead of using more mass production methods, habit of hand work instead of power tools, habit of chasing for bids instead of creative business building, habit of substituting and trimming bids instead of selling a quality installation. This indictment does not apply to all contractors, but to sufficient numbers whose tactics force the contractors who would do better to resort to the same methods in order to survive themselves.

Already this intangible has become all too tangible. During the rush days of the tremendous construction program to provide war facilities, all contractors who remained in business had more than they could do and they built up big organizations. Of late, while there are still a number of war facilities jobs under construction and a number yet to come, the competition has become cutthroat.

If this continues into the privately financed building construction market, it will not only make it a profitless struggle for existence, but destroy many of the chances that the market offers if the opportunities are exploited intelligently and constructively. More intent on what the competitor may or may not do than upon making something better out of each job, a contractor will become his own biggest obstacle to profit and prosperity.

The Answer

After this roll call of obstacles and hindrances, of hazards and infections, it may be surmised that the outlook for contractors is dark, forboding, unprofitable. Like the contracting business itself, that is up to the individual.

Potentially there is an excellent market. The country is badly in need of all kinds of construction. There will be a great variety of new electrical services and equipment to offer. With these a good salesman can build excellent business for himself. The public is eager for a change, for something new, for improvements, for remodeling and a fresh start on things. Most businesses plan expansions, new plant facilities, changeovers.

The outlook for the contractor depends on his eyesight—his vision of the future, his seeing of his opportunities.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO . 4

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Lights On Again

SYMBOLIZING the return of some degree of sanity to a war mad world, the old Ferry Building tower in San Francisco, dark since Pearl Harbor's attack, has been floodlighted again in color in honor of the United Nations Conference. Signal, too, of returned commercial enterprise, the Shell Co. building tower was relighted in its golden color. The war in Europe is over and the tangled threads of national interests now need to be unscrambled before there can be genuine peace.

Boat-filled Western harbors, their docks piled high with equipment for the Pacific war, attest to the size of the job still to be done. It is no wonder that V-E day was quiet, sober, and that practically everybody just kept on working in the West. To us this Pacific war has always been No. 1 on the list.

But because Americans are an energetic people restrictions on manufacture of all kinds of goods are being removed quickly these days. Manufacture and distribution will start soon. No doubt business will boom and almost normal living return.

But in all this lies Japan's greatest hope of winning its war against us. Japan knows now that it cannot defeat our arms, once we are armed and fighting. But if we can be diverted to thinking the war over, to being weary of it all, to becoming too busy with peacetime pursuits to ship the weapons necessary for our men fighting in Asia, then Japan can outlast us and win. It knows that America is flashy, capable, but easily bored. It also knows that the Eastern part of the country has its eyes more on Europe than the Far East.

But the war is not won yet for the West. Until it is the West will be the gateway, and a crowded one, to serve that war. This must not be crowded out of mind. It may be a long fight. We must show we also have the staying power as we have the striking power.

Rural Expansion Challenge

THE challenge to serve "that last farm" within the territory of Western power companies is to be met postwar in an all-out rural extension program of the private utilities as reported elsewhere in this issue. Combined with REA's extension plans for the eleven Western states the rural electrification program as a whole calls for the expenditure of approximately twenty-five million dollars upon availability of materials and labor. This does not include at least another ten million for farmers' wiring and utilization equipment. Altogether, it is a tremendous forward looking program that will bring the benefits and blessings of electric service to every nook and corner of the West—already the most intensively electrified section of the nation.

Thus the electric industry meets its obligation to agriculture, at the same time providing a postwar workpile backlog that embraces more than 5,000,000 man-hours of employment.

Please, No Cherry-Pickers

IN its zeal to build markets for its postwar power surplus and at the same time create friendly relations with an increasing number of local organizations, the Bonneville Power Administration is embarking upon some questionable promotional undertakings. Existing manufacturers of electrical equipment whose engineering knowledge, facilities and products have helped to build the physical system of BPA cannot feel very happy over the following paragraphs from a recent Bonneville press release commenting on Northwest industrial development:

"Raver's statement accompanied announcement of a Bonneville program to display in a number of Northwest cities, materials, equipment and miscellaneous hardware items used in the construction of transmission lines and substation facilities that could be manufactured in the Northwest by small industrial operators with a minimum of re-tooling.

"The program has been developed by Bonneville's division of Industrial and Resources Development to assist small Northwest industries in appraising the manufacturing opportunities and

potential field of electric transmission and distribution line hardware and equipment.

"The displays are accompanied by catalogues containing information as to quantities presently required and estimated needs for the future; methods of manufacture; descriptive material and specifications. . . ."

It is strange how the normal supplier-customer relationships can be quickly forgotten or completely ignored in dealings between a governmental agency and business organizations. Obviously the regular manufacturers and suppliers of equipment heretofore used by BPA are likely to be critical of these efforts to develop what the trade refers to as "cherry-pickers" or "hitch-hikers." Maybe the total volume of business available is sufficient to warrant the creation of new sources. Maybe too the new suppliers will contribute something new in design or engineering. However, until there is some assurance that such is to be the case, the established manufacturers have every right to be critical of BPA.

Appliance Blessing or Boomerang

PUBLIC demand for electrical household appliances had reached staggering proportions by the time V-E brought hope for early production. The Office of Civilian Requirements estimated that 5,852,000 people would purchase electric refrigerators if they were available; another 4,501,000 would buy vacuum cleaners and 5,835,000 were potential purchasers of washing machines. Figures for radio and other appliances were equally large. The OCR emphasized that these represent current demands and not postwar market totals.

Existence of a market of such proportions can be both a blessing and a curse to the electrical business. Such a demand coupled with only limited initial production could create uncontrolled price inflation and black market operations. To prevent any such occurrence a freezing of sales at the retail level has been proposed until a backlog of stocks and inventory can be built up to satisfy initial demands without runaway prices. The only other course would be to ration the new equipment. The appliance trade itself will have to choose one or the other of these checks.

However, the possibility of irregular marketing is not the sole difficulty. The business and profit potentials of the electric appliance field are powerful magnets in attracting all varieties of people who aspire to make a livelihood in distributing and selling appliances. Many service men express such a desire and hope. This hope is laudable. The field will need plenty of new blood. But the mere wish to become either a dealer or a salesman is not enough. Anyone familiar with business knows that experience and training are prerequisites for success. Sales training especially is essential.

For the sake of the stability of the appliance business and as a service to the returning veterans, the industry itself should be making plans to counteract both of these possibilities.

Curtail German Power?

AMONG the many measures for future control over Germany and Japan is one which would strictly limit the electricity-producing facilities of those countries. Theory of the originators is that most of the tools of war require electric power in huge quantities for their production. They suggest that in the case of Germany, present war damaged electric plants be left as they are. They would not permit construction of any new stations. Instead they would organize an international company which would generate or purchase electric power in countries adjacent to Germany and then sell this power to distributing agencies. In this manner control could be exercised over the manufacture of such vital war raw materials as aluminum, synthetic oils, hydrogen and nitrogen. In this particular engineers in America would agree heartily because of the war job electric power has done in this country in the production of these materials. But as a means of controlling the future of Germany, we would suggest that there are better and more practicable ways than to attempt to control the sources of electric power. However, there is one positive electrical method of treating the Nazi leaders. In the language of criminals, it is called "the hot seat."

THERE are fanatical advocates of a certain philosophy of government who would merely argue that we should profit by the mistakes of the Tennessee Valley Authority and create better and finer authorities on the basis of that experience. It is my purpose therefore to suggest that this whole idea of a virtually autonomous corporation with all of the power and immunities and privileges of the Federal Government combined with all of the powers, privileges and immunities of a private corporation is a misbegotten concept of the functions of government alien to the American system and detrimental to the processes of democracy. It can prove to be a cancerous growth, which in the end could destroy the system of government as we know it now.—A. J. May of Kentucky, Chairman of the Military Affairs Committee of the House of Representatives.

Appliance Patient Shows Signs of Life

San Diego Bureau clinic conference comes out of periodic checkup with Television of possibilities

THAT more than $500,000 worth of rural electrical lines will be constructed in San Diego County during the first year after the war was revealed by A. E. "Doc" Holloway, sales vice-president of the San Diego Gas & Electric Co., in an address before members of San Diego's Bureau of Radio and Electrical Appliances at their annual Spring Conference, May 15.

Emphasizing the expansion expected toward rural areas, Holloway said: "Despite wartime restrictions which have limited the average individual from obtaining rural electric service, our company connected more rural customers in 1944 than in any previous year."

The recent engineering study of San Diego made by Day and Zimmerman Inc., showed that, out of 3,050 agricultural counties in the United States, San Diego ranks twenty-third from the standpoint of value of products, Holloway said. He predicted that dealers would find this a rich market for electric pumps, wiring, water systems, storage cabinets, home and farm freeze units, brooders and lighting equipment, as well as electrical household appliances such as ranges, refrigerators and electric water heaters. Holloway warned that the farm market would have to be developed through education and advertising and that, in order to sell the farmer, dealers would have to offer reliable service repair facilities.

"You will have to learn to talk the farmer's language," he said. "I would advise anyone entering this field to outfit a complete demonstration truck and hire a salesman to visit the back country, and make demonstrations of new equipment, as well as offer repair of old equipment, in order to become acquainted with this important market."

Highlight of the conference was the address by Dr. Lee de Forest, father of radio and pioneer developer of television, who spoke on the subject *Television and Some of Its Economic Aspects*. He warned that television's entry into the field will not emulate that of radio 25 years ago. "In those days, people were enthralled at the mere idea of hearing a human voice over the air. As a result, early broadcasters could afford cheap talent and 'ham' programs. Such is not the case with television. People have become spoiled. They expect first-class entertainment over the air, and if television lets them down then its future is periled." Telecasting will therefore call for very expensive programs, for it will have to match the motion picture in smoothness of presentation. He predicted that, to keep telecasting within profitable limits, broadcasts will first have to be recorded on sound films, smoothed out, and the necessary retakes made before actually being telecast.

Dr. de Forest said it is expected that television sets, ones having a large enough screen to eliminate eye fatigue, would cost $250 or more. He maintained that "in order to build up quickly an audience large enough to interest commercial sponsors in lavish programs, it will be necessary for manufacturers to rent sets to the public."

"Within a year or 18 months," he contended, "the manufacturer would have his investment back. Otherwise 100,000 or so cheap small screen sets will be sold as novelties, but people won't look at them hour after hour and television will fail."

E. W. Meise, domestic electric sales engineer for San Diego Gas & Electric Co., outlined his utility's proposals for postwar dealers' sales helps. Such helps will be divided into five major divisions: Sales aid will be given on major domestic appliances in electric territories through a major appliance specialist; and there will be utility specialists in the fields of home lighting, wiring, small appliances and home economics. Further aid will be given in the form of advertising help in the preparation and layout of dealers' ads, Meise said.

Elbert Kramer, Pacific Coast manager of the better homes department, Westinghouse Electric Corp., outlined the possibilities of tremendous appliance sales in new homes after the war, but warned that a great deal of selling would have to be done to convince architects, contractors and the building trade in general on the absolute necessity for better home wiring. There are 29 utilities on the Coast that are now helping to put this wiring program over, he pointed out.

Speaking on the subject, *Selling Must Come Sooner Than We Think*, Steve Maher, manager appliance distributing branch, General Electric Co., complimented the dealers on the way in which they have pulled out of the spot they were in during 1942. "No one," he said, "would have dreamed four or five years ago that we would have made the money that we have during these past few years." He warned that appliance business would be different in the future than it was in prewar years. "No more sidewalk, corner lot or hole-in-the-wall operations. Nor do we want any recurrence of the operations of the middle thirties when anyone walking in the door was automatically given a 20 to 30% discount." He urged the dealers to check their store locations for floor traffic, remodel their fronts for more attractive displays, and to take advantage of the tremendous national advertising by carrying the manufacturers' identities on their store fronts.

During the afternoon's "Distributor-Manufacturer Bull Session," Fred S. Fenton, Jr., Easy Washer Co., revealed that he "had it from the horse's mouth" that Easy expects release of materials by June 1, pilot production by August or September, and that there would be washers on the dealer's floor in time for Christmas sales. Easy distribution would be on an area basis, he said, so that all dealers in an area would receive washers at the same time.

Will C. Hahn, president of Maytag West Coast Co., stated that Maytag would maintain the same distribution set-up as in the past, namely factory-direct. H. L. Hoffman, president of the Hoffman Radio Corp., revealed that his company will offer a complete radio line designed especially for California dealers. Burt Dorris, Stromberg-Carlson Co., stated that his firm was doing considerable research with wire recording and that its high fidelity reproduction offered many possibilities after the war.

Kinney brothers Roland and Wendall of Kinney Brothers Distributors stated that their firm would distribute aluminum cooking utensils and laundry equipment, gas and electric ranges, refrigerators and clothes dryers after the war. They emphasized that a great deal of missionary work would have to be done with the architects and contractors to provide proper facilities for the coming innovations in laundry equipment.

Other speakers included: Harry Fogwell, Thermador Co.; Morris Breslow, Utility Appliance Co.; L. D. Stoll, Apex; Lou Willis, Admiral Radio; John Gunderson, Thor Pacific; Charles Moore, Chicago Flexible Shaft Co.; Everett Isenhauer, Westinghouse Co.; Lowell Wood, Packard Bell Co.; H. R. Wiseman, Rohr Aircraft; Lou Swenson and Shorty Sherman, Sherman-Swenson and Associates; Herbert H. Horn, Herbert H. Horn Co.; Paul Buehler, Leo J. Meyberg Co.; and Si Frellson, General Electric Supply.

SELECT G-E FUSES
For Your Wiring Jobs

Protect the wiring systems you install and your customers' electrical equipment with G-E fuses. Use them on maintenance jobs you handle. These are the same fuses General Electric uses to protect its own wiring and equipment. They are made of the finest materials and are thoroughly tested and accurately rated.

G-E Non-renewable Enclosed Fuses 1–600 Amp., 250 V. or 600 V. Both indicating and non-indicating types are available.

G-E Renewable Enclosed Fuses 3–600 Amp., 250 V. or 600 V. Fiber bar supports link, provides proper alignment of terminals, facilitates replacement.

G-E Silvend Fuses with silver-plated contacts 3–600 Amp. 250 V. or 600 V. Designed for use with apparatus having silver-plated fuse contacts. Heating due to oxidation does not occur with this combination.

G-E Pyrex Plug Fuses 3–30 Amp., 125 V. Neat appearing. Have magnifying windows for easy reading.

You'll find G-E fuses of the correct type and proper rating to use on all your jobs. They are all high quality and in keeping with the finest wiring.

IMPORTANCE OF ADEQUATE WIRING
Victor W. Hartley, managing director of the Pacific Coast Electrical Association, Los Angeles, Calif., says, "Wiring is a 'hidden value.' Upon its adequacy depends, in a substantial degree, not only the quality of the structure, but its soundness as a long-term investment."
ADEQUATE WIRING
THE KEY TO THE HOME OF TOMORROW
SERVES AND SAVES

G-E CONDUIT AND BUILDING WIRES

There are five different conduits and many building wires in the G-E line including: G-E White and G-E Black rigid conduits, EMT, flexible conduit, Fiberduct and Types SN and SNW small diameter, thermo-plastic insulated Flamenol* Building Wire.

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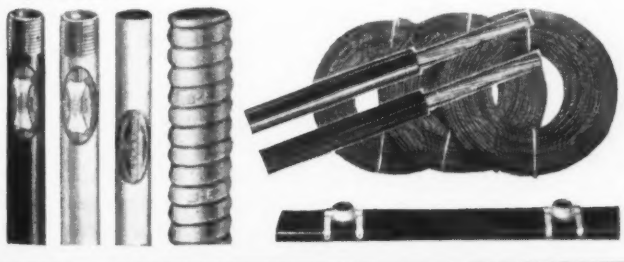

Hear the General Electric radio programs: "The G-E All-Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news, Mon. through Fri. 6:45 P.M. EWT, CBS. "The G-E House Party" Mon. through Fri. 4:00 P.M. EWT, CBS.

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SUPPLY CORPORATION

A national organization serving the West with conveniently located Offices and Warehouses

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FRESNO, LOS ANGELES, SAN DIEGO, CALIFORNIA
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PORTLAND, OREGON PHOENIX, ARIZONA

Traveling Institutes

Montana conducts series on home planning

IN Montana the Home Planning Institute went on the road like a Chautauqua to reach the widely scattered communities in which it was held. Sponsored by the State Department of Home Economics Education of which Edith Harwood is the state supervisor, the institutes were planned and operated as a two-day session in each of the following towns: Missoula, Bozeman, Helena, Great Falls, Lewistown and Billings. The electrical industry had three places on the program.

While the pattern was similar, the program was adjusted both in meeting time and in speakers to suit the particular locality in which the institute was being held. As a rule the meetings were two-day affairs beginning on the morning of a day, having an afternoon and evening session and following with a morning and afternoon session day. At Helena, however, the meetings were held Wednesday evening, Thursday afternoon and evening and Friday afternoon. Subjects were the same at each meeting but in some instances were handled by different speakers.

For the electrical items on the program three topics were assigned. First was *Electrical Living in the Postwar World*, which was presented by D. J. McGonigle, general sales manager, Montana Power Co., Butte. Second subject was *Lighting the Home of Tomorrow*, which was given by Miss Mary Weber, home lighting specialist, General Electric Co., Nela Park, Cleveland, at the Lewistown, Great Falls and Billings meetings, and by Jean Waite, home service representative, of Montana Power Co. at Helena and Bozeman. In Missoula, John Cromer, assisted by Mrs. Helen Karnop, home economist, Montana Power Co., Missoula, presented the subject.

Third subject was *Wiring for Safety, Adequacy and Convenience*, which was presented by R. E. McDonough, Montana Power Co. at all except the Bozeman meeting, where it was presented by John Cromer, Montana Power Co., Butte.

Other speakers included W. J. Howard, executive secretary, Montana Retail Lumbermen's Assn.; Fred Wilson, architect; Ben S. Hill, Federal Housing Administration, Helena; Carl Ross, representative, American Red Cross; as well as Helen Gleason, chairman, home economics department of Montana State University, and others.

Attendance at each of the institutes was beyond all expectations. Missoula had an attendance of 200, Great Falls 150, and the other cities similar numbers. Newspaper publicity was excellent. An advertisement was run jointly by various sponsoring organizations of local dealers, banks, power companies, etc., and radio announcements were made.

Each one attending was presented an envelope full of literature provided by the various sponsoring groups. This literature was of an educational nature and that presented from the electrical group included a pamphlet *Moving the Sun Indoors, Electrical Guide to the Postwar Home* and *Our Eyes Are a Priceless Gift*.

As a result of the first series requests were made for others to be held in other cities in Montana, according to D. J. McGonigle who likewise said of the entire group, "Mrs. Edith Harwood, state supervisor of Home Economics Education, whose office is at the Montana State College, Bozeman, was the organizer and inspirational genius for this group of successful meetings. Basically her thinking was that postwar housing falls within the category of adult education and all branches of industry having to do with building, equipping and decorating of homes were invited to present their respective stories. In reality these meetings were a happy combination of educators and business people working together to enlighten postwar builders and remodelers."

Home planning institute as it was held at Bozeman, Mont., one of several cities

"Conservicing"

Jim Brown and Walter Schanz have begun "conservicing" again throughout the West. With new and improved demonstration equipment, and more of it, they have started the third year of training schools for appliance service personnel throughout the West as a part of the service program of Westinghouse Electric Appliance Division. A half-day session on commercial refrigeration and on the automatic washer, the Laundromat, have been added to this year's program.

J. A. Brown is Pacific Coast district service manager working out of the Appliance Division at Western Merchandise Mart, San Francisco and Walter Schanz is the Northwest district service manager operating from Seattle.

New props for this year's training include a 30-minute color motion picture entitled *It All Adds Up* and 30-minute sound slide film on *The Refrigerator Temperature Control*. The first shows how good service builds good will and tells the steps a young service man should take in making home calls and presenting his service to the customer.

The program has two one-day schools, the first covering domestic refrigeration and specialties including condensing units, reach-in refrigerators, beverage coolers, milk coolers, water coolers and plug-in air conditioners. The second deals with electric ranges, water heaters and laundry equipment, both the automatic and the conventional type.

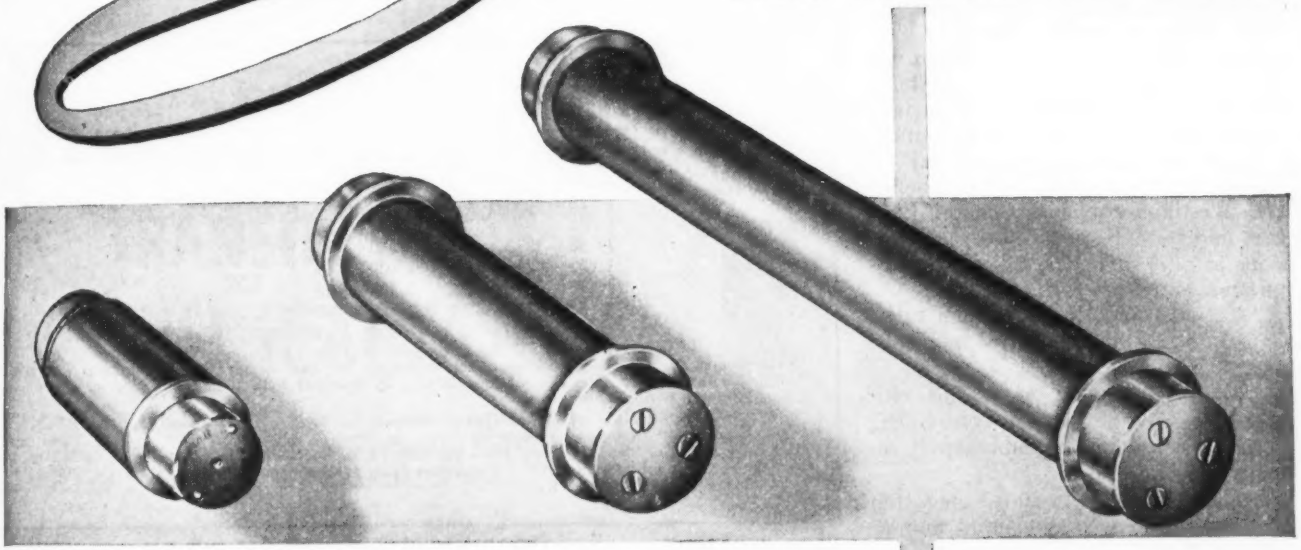
To show the working mechanism of the temperature control more dramatically, a magnified model of the control has been mounted on a demonstration board, connected with gauges which show the effect of adjustment for temperature range. Trouble diagnosing charts and an analyzer and numerous other educational devices are included in the graphic demonstration method employed to carry on these schools.

Western schedules started in April continuing through mid-June, reaching all trade areas of the region.

In each series Westinghouse Electric Supply Co. appliance and service managers also participated and made the program arrangements.

ALL THE *Stability*

THE NAME IMPLIES!



WESTON TUBULAR RESISTORS

WESTON tubular resistors . . . widely used since their introduction over a decade ago . . . furnish another outstanding example of *sound engineering* coupled with *engineering foresight*. For no new 'hurried' resistor design was needed in order to meet exacting military specifications that called for protection against tropical humidity, arctic and high working temperatures, and salt air. The WESTON tubular resistor met these new specifications . . . and in a rugged, non-fragile design *tried and proved* throughout the years. These resistors conform to and are approved under joint Army Navy Spec. JAN-R-29. Bulletin A-12 gives complete specifications. Send for your copy . . . Weston Electrical Instrument Corp., 672 Frelinghuysen Ave., Newark 5, N. J.

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In Canada, Northern Electric Co., Ltd., Powerlite Devices, Ltd.

EMEA *Dope Sheet*

Those Long Thin Fluorescents

SLENDER LINES are the fashion in lamps as well as in women. Each lamp manufacturer may call it by a pet name, but the long, thin, or slim fluorescent lamp may soon be expected to emerge from the "experimental model" stage and become available for even non-priority lighting. And because it may, the electrician, the maintenance man, the contractor, may wish to know what it will require in the way of sockets, ballasts, wattage and what it will cost, how long it will last and similar information.

From the information thus far released by the two Mazda manufacturers, Westinghouse and General Electric, and by Sylvania, whose specifications are the same, the following compilation is made:

Sizes—42 in., T-6 or ¾-inch tube; 64 in. T-6; 72 in. T-8 or one inch tube and 96 in. T-8.

Color—White only now, but ultimately in daylight and in colors. The output figures in the table apply to the white lamp.

Starting — Instant start operation without starter. No flicker at end of life.

Brightness—Depends on current input. Brightness of T-8 lamps at 100 milliamperes (0.1 amp.) is 70% and at 200 ma. is 100% of the standard 40-watt T-12 white fluorescent lamp. The T-6 lamps range from 100% to 160% of the 40-watt F lamp. Lumens per watt are higher with this type of lamp than other types. At high loadings they also give a higher lumen output per foot than previously available from long thin fluorescent sources.

Sockets—Bases of lamps have single-pin construction of greater mechanical strength, which fits into special lampholders similar to those illustrated here. Since the pin is only 5/16 in. in diameter, the fingers cannot readily touch the contacts in either lampholder. One holder is designed to disconnect the primary circuit to the ballast when the lamp is removed. The other socket contact is made when the lamp depresses the spring holding it in place. The operating circuit is shown in the illustration.

Series operation — Eventually these lamps may be operated in series, but at present a socket for safety has not been fully developed. The sockets shown provide safety for multiple use but the series operation may require an adapter to fit over the base so that fingers cannot touch the base pin when handling the lamp. Series operation will have the advantage of simple wiring and satisfactory operation at low ambient temperatures.

Ballasts—For multiple circuits lead-lag systems will be used to improve power factor, efficiency and eliminate stroboscopic effect. They will be similar to the two-lamp ballasts used for standard lamps but operate at higher starting voltage as indicated in the accompanying table. For series operation a different type of ballast or transformer will be required.

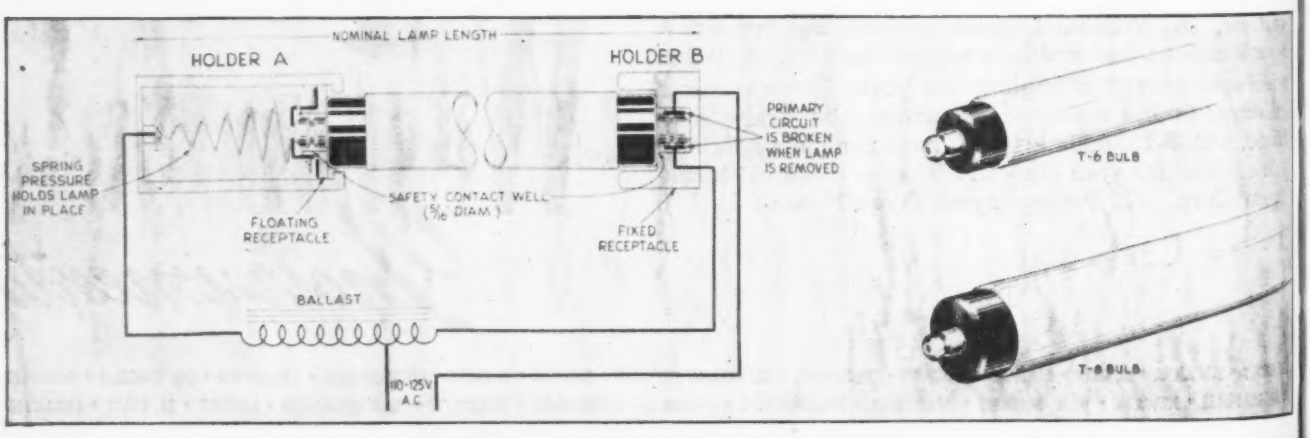
Grey stripe—To facilitate instant starting even under adverse conditions of high humidity and low temperature with a minimum sized ballast, a thin grey stripe is permanently placed inside the bulb extending a short distance from each base. This may be rotated so that the stripe is hidden from view.

Lamp Designation* (Type, Size, Color)	Lamp Watts	Volts	Amps.	Rated Lumens	Rated Lumens per Watt	Rated Average Life**	Minimum Starting Voltage Recommended	List Price
F42T6/W	15	170	0.1	900	60	2,500	450	$1.55
	25	145	0.2	1,400	56			
F64T6/W	23	270	0.1	1,400	61	2,500	600	1.75
	38	230	0.2	2,150	57			
F72T8/W	22	245	0.1	1,400	64	2,500	600	2.00
	38	215	0.2	2,350	62			
F96T8/W	30	335	0.1	1,950	65	2,500	700	2.70
	52	290	0.2	3,300	63			

* The figures 42, 64, 72 and 96 represent in inches the over-all length of one lamp and two multiple lampholders. The designations T6 and T8 represent bulb diameters of ¾ in. and 1 in. respectively. W indicates white.

** The rated average life of these F lamps depends on total burning hours as well as burning hours per start as follows: 3 burning hours per start—2,500 hours life; 6 burning hours per start—4,000 hours life; 12 burning hours per start—6,000 hours life. These values are for 0.2 amp. operation. For 0.1 amp. operation life values have not been established beyond the 2,500 hour rating at 3 hours per start.

Construction of sockets, wiring diagram and bases of the Slimline lamps, as illustrated in Westinghouse drawings



Cooler Cables!

LABORATORY TESTS PROVE:

TRANSITE DUCTS DIFFUSE HEAT FASTER!

FROM LABORATORY TESTS lasting more than two years comes proof of the superior heat-dissipating qualities of Johns-Manville Transite Ducts.

By applying the data from the tests to specific field conditions, J-M Engineers have determined the comparative I^2R losses of underground ductways in actual operation. They have found, as a result of a number of such studies, that Transite Ducts dissipate these losses up to 13% faster than the other ductways tested.

It is apparent, therefore, that cables in Transite Ducts have a higher inherent load capacity. Or, carrying rated loads, cables will run cooler, thereby reducing copper losses and increasing cable insulation life.

Transite Ducts are strong, immune to rust and rot, incombustible, not affected by electrolysis or galvanic action. Smooth bore makes possible long cable pulls and easy replacements. Long, lightweight lengths can be quickly installed. And, a variety of fittings simplifies even the most complicated installations.

For full information write for Data Book DS-410, Johns-Manville, 22 East 40th Street, New York 16, New York.

Johns-Manville ***TRANSITE DUCTS***

CONDUIT for use without concrete

KORDUCT for concreting in

JOHNS MANVILLE JM PRODUCTS

Who

Albina Engine & Machine Works, Portland. Engineered by own staff and installed by it.

The Need

Better levels of illumination in office where critical seeing of figures and computations is required.

Conditions

Building without ceiling and with open trusses provided no reflecting medium for desirable indirect illumination to eliminate shadows and contrasts.

Installed

Artificial ceilings of plywood about 18 in. above 500-watt silver bowl lamps and concentric louver units, both of which were suspended on hangers from roof truss lower chords about 12 ft. from the floor.

Results

Even distribution of illumination and satisfactory seeing conditions to supplement natural daylight.

LIGHT FOR CRITICAL SEEING

Incandescent

The Need

Suitable illumination needed for various fine machine operations involved in tool making where precision measurements are made with bright metal scales and instruments.

Conditions

Previous lighting from industrial type fluorescent units created specular reflections on bright metal instruments. Shop area is 17x26 ft., 12-ft. ceiling. Walls and ceiling painted flat white.

Installed

General illumination provided by six 500-watt totally indirect incandescent lighting fixtures on approximately 9-ft. centers.

Results

Readings taken on a horizontal plane on bench tops 24 in. above the floor, 80 f-c in the middle of the room, 60 at the walls, after three weeks' operation. Intensity sufficient so that general lighting is adequate for most of visual tasks involved. Increased cost of eight cents per hour not a factor where shop time is charged at $5 per hour and work accuracy and speed is improved. Heat produced by lamps is exhausted to an adjoining large shop where it is used advantageously.

Who

Accurate Tool & Engineering Co., 640 Tenth St., San Diego. Designed by C. M. Thompson, San Diego Gas & Electric Co.

Cutting Hours from Construction and Maintenance Time . .

★ It takes less than two minutes to bore holes through frost, shale, rock, hardpan, gumbo, sand, gravel—in swamps and on hillsides. That's one of the reasons why HIGHWAY Earth Boring Machines are used so extensively. This advanced method for "boring the hole and setting the pole" is something to think about now. It may not be long before extensive line construction activity gets under way and it is for such time that carefully laid plans should include the HIGHWAY Earth Boring Machine.

The HIGHWAY has the power and strength to operate with the largest truck and tractor motors—it is sufficiently light in weight and compact in construction to be practical on 2½- or 3-ton trucks.

Clipping hours from schedules will no doubt be an important factor in new construction and here is a way of accomplishing it easily.

HIGHWAY

EARTH BORING MACHINES

ARMY E NAVY

Bore the Hole And Set the Pole

HIGHWAY TRAILER COMPANY

MANUFACTURERS OF

TRUCK TRAILERS AND BODIES • EARTH BORING MACHINES • WINCHES • OTHER PUBLIC UTILITY EQUIPMENT

General Offices

EDGERTON, WIS., U. S. A.

Home Fluorescent

One out of every ten homes called on by an independent research organization in making a survey for Sylvania was found already to have some fluorescent light. The kitchen will be the first to receive this type of lighting and the bathroom and bedroom next. Asked what they thought about fluorescent lighting, 94% of those who have it expressed satisfaction. The majority said it was because they liked the quality of the light and found it easy on the eyes and economy was second consideration. Six per cent found fault with fluorescent, their chief complaint being that fixtures were not attractive enough.

It was found, also, that fluorescent sales are in direct relation to living standards, the top income group accounting for over 26% of the installations. Home ownership also influenced the market. Thirteen per cent of home owners had fluorescent lighting as compared with 5% of renters. It was estimated from the survey 6½ million families will have new or additional fluorescent lighting after the war, according to Frank Mansfield, director of sales research for Sylvania Electric Products Inc.

Revised Handbook

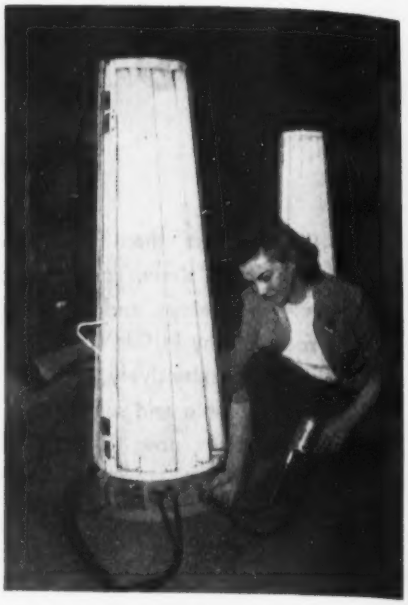
Divided into two sections will be the revised standards for adequate wiring in homes and on farms. The work is under a subcommittee of the industry committee for the preparation of the handbooks, which will be issued as *Handbook of Residential Wiring Design* and *Handbook of Farmstead Wiring Design*. The form and arrangement of the residential handbook will differ considerably from the original one in that its convenient use will be easier and a clear distinction will be drawn between requirements and recommendations.

The farmstead wiring standards are the outcome of considerable new work. It will pioneer to a great extent in this field and cover wiring for light and power in all types of farm buildings as well as outside distribution systems for the farm.

Pyramid Lights

Pyramids which combine lighting, electric outlets and compressed air outlets have been developed at the Douglas Santa Monica plant to light the interior of the huge C-54 fuselages and to supply those working inside with a convenient point to tap for portable tools either of electric or compressed-air operation. The towers are 47 in. high, 10 in. in diameter at the top and 18 at the base and contain ten 40-watt fluorescent tubes mounted vertically, with a conical reflector back of them and protected by a wire screen.

The electrical outlets and the air outlets are incorporated in the base and thus make it possible to use short hoses and short cords to rivet guns or electric drills, respectively. Although developed by plant engineers and maintenance men for the aircraft industry, the idea has possibilities of application in other places where portable illumination and a convenient place to tap electrical or air tools is required.



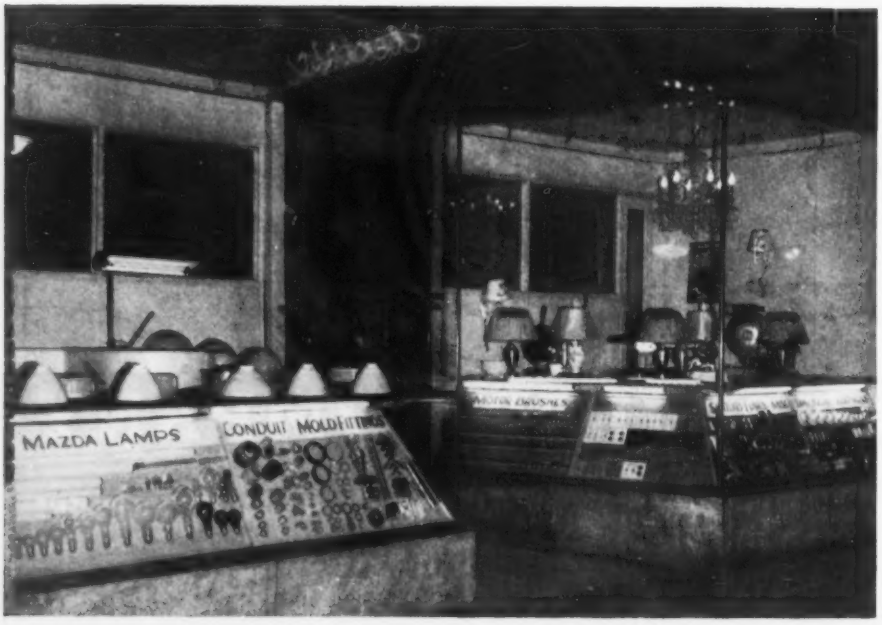
Portable tools, either electric or compressed air, can be plugged into the base of these portable light pyramids

Prefabs Protested

Protesting the proposed commercial standard for prefabricated homes which has been sent out for endorsement by the Division of Trade Standards, U. S. Department of Commerce, the National Adequate Wiring Bureau points out that the standards for wiring only call for conformity to the requirements of the current National Electrical Code. In making its protest, the National Adequate Wiring Bureau points out that the Code itself warns the user that it is merely a minimum practical safety standard and that compliance with it will not result in an installation that is necessarily efficient or convenient.

The Prefabricated Home Manufacturers' Institute has been developing standards which it hopes would eventually be endorsed by the National Bureau of Standards. The manager of the institute asked for help in developing the wiring standards part of the job and the NAWB presented its standard in mimeographed form. This was reported as being too complicated and in the opinion of some of the board of directors of the Prefabricated Home Manufacturers was too high. NAWB then presented a simplified standard. Westerners also point out that unless the standards are high the prefabricated homes will not be acceptable to many local communities whose ordinances require more than the minimum of the National Electrical Code.

Almost sold out of fixtures, and cleaned completely of appliances, Lighthouse Electric Co., Ogden, manages to keep an attractive window display of portable lamps, reflectors and fittings. Neat display boards of Mazda lamps, fittings, motor brushes, switches, etc., make a permanent window advertisement



Anita Clagett, Supt. of Nurses, Jackson, Miss.
Turner A. Farrow, Farmer, Oshkosh, Wisconsin
C. B. Dowdey, Elevator Mech., Birmingham, Ala.
Eva Laborde, Housewife, New Orleans, La.
C. S. McDonald, Police Officer, Alexandria, Va.
L. G. Ray, Dentist, Madisonville, Kentucky
Raymond F. Panch, Painter, Pittsburgh, Penna.
P. F. Smythe, Tool Crib Foreman, Wichita, Kans.
Ruth Dowell, School Teacher, McKinney, Texas
These people are your partners
Do these folks look like tycoons?
They come from all over the ... and many walks of life. Directly or indirectly, they are business partners of yours.
Directly, if you own stock in an electric ... and power company as these nine people do. They were picked at random from several million shareholders in America's business managed electric companies.
Indirectly, if you have a savings account or life insurance policy, like 67,000,000 other Americans. When you make a deposit or pay a premium, the money is invested—put to work for you.
Banks and insurance companies invest your money ... put a lot of it into light and power ... because ... companies have proved their soundness ... years.
So the electric industry is ... the most widely owned industry in America. You and almost every other adult American are partners in it. And whatever helps the industry helps you.
• Hear NELSON EDDY in "THE ELECTRIC HOUR," with Robert Armbruster's Orchestra. NOW every Sunday afternoon, 4:30, EWT, CBS Network.
167 ELECTRIC LIGHT AND POWER COMPANIES
SELF-SUPPORTING, TAX-PAYING BUSINESSES
• Names on request from this magazine.

LOOK over the faces in the advertisement above. Typical, hard-working Americans. They represent several million similar stockholders in America's *business*-managed electric light and power companies.

They give eloquent answer to the worn-out wheeze that all such companies are owned by a few rich men!

Readers of national magazines will see this advertisement during June. It is another in the cooperative series reporting the record—past and present—of America's *tax-paying, self-supporting* electric companies.

Other advertisements appear regularly in farm publications and newspapers. And back of all this is the popular radio program—"The Electric Hour," featuring Nelson Eddy—every Sunday afternoon (4:30, EWT) over CBS.

Be sure to listen to "The Electric Hour" regularly. Watch for the advertisements as they appear. Discuss them with your friends. Remember, this whole program is designed to do a job for *your industry—your company—and YOU.*

167 ELECTRIC LIGHT AND POWER COMPANIES*

SELF-SUPPORTING, TAX-PAYING BUSINESSES

*Names on request from this magazine.

PCER Panorama — Edited by Mary Shoop

Conference Programs

Operating and Administrative Section agenda announced

INTERESTING and valuable programs will be presented at the Pacific Coast Electrical Assn. conferences, which will be held in Los Angeles at the Ambassador Hotel on June 21, and in San Francisco at the Fairmont Hotel on June 28.

Details were given in the April issue of ELECTRICAL WEST on the program of the Business Development Section, on which four nationally prominent speakers will appear—A. H. Schanuel, secretary of the Indoor Climate Institute; C. E. Greenwood, commercial director of the Edison Electric Institute; Dr. D. K. Tressler, director of the Consumers' Institute, General Electric Co., and Miss Mary Webber, home lighting specialist, General Electric Lamp Department.

Other data concerning the conferences is:

Operating Economics Section

Chairman of the guidance committee, E. W. Morris, Westinghouse Electric Corp., Los Angeles; vice-chairman, C. E. Baugh, PG and E, San Francisco; members, C. J. Nevitt, San Diego Gas and Electric Co.; C. T. Malloy, Southern California Edison Co., Los Angeles; A. F. Ayres, California Electric Power Co., Riverside; R. N. Phelan, McGraw-Hill Co., Los Angeles; C. E. Cunningham, R. E. Cunningham and Son, Los Angeles; F. H. Searight, Allis-Chalmers Mfg. Co., San Francisco; M. S. Barnes, General Electric Co., San Francisco; G. E. Bishop, Coast Counties Gas and Electric Co., Santa Cruz; D. W. Nurse, the Okonite Co., San Francisco.

The section will meet all day in general assembly, with the following program:

Morning

1. Transmission line conductor reinforcement—T. F. Peterson, American Steel and Wire Co., Cleveland.
2. Chemical removal of scale from heat exchange equipment — Ward B. Kennis, manager, chemical department, International Cementers, Inc.
3. History of development and operation of air circuit breakers—A. W. Hill, manager, power circuit breaker engineering department, Westinghouse Electric Corp., East Pittsburgh.

Afternoon

1. Bell Helicopter, a 15-minute sound color film by Bell Aircraft Corp. dramatizing a new kind of air transportation.
2. Economics of distribution systems —O. B. Falls, central station engineering department, General Electric Co., Schenectady.
3. Value and techniques of job evaluation in public utilities — different speakers will handle this at each conference.
4. Electric fish screens for steam and hydro plants—demonstration by H. T. Burkey, the Electric Fish Screen Co.

Administrative Services Section

Chairman of the guidance committee, William de Waard, San Diego Gas and Electric Co.; vice-chairman, G. F. Maughmer, General Electric Co., Los Angeles; members, A. L. Code, Southern California Edison Co., Los Angeles; H. A. Cordes, General Electric Co., San Diego; Charles Grunsky, Coast Counties Gas and Electric Co., Santa Cruz; Leon S. Heseman, California Electric Power Co., Riverside; R. A. Hopkins, Westinghouse Electric Corp., Los Angeles; A. J. Noia, PG and E, San Francisco; H. H. Scoville, PG and E, Emeryville; F. U. Naylor, PG and E, San Francisco; M. W. Phillips, Southern California Edison Co., Visalia.

At the northern conference in San Francisco, the entire section will meet as a unit during the day with this program:

9 a.m.—12 noon—Round-table discussion of personnel problems.
2-3 p.m.—Talk by a qualified speaker on employee relations.
3-5 p.m.—Round-table discussion of credits and collections, and customer relations problems.

At the southern conference in Los Angeles, the accounting group will meet as a unit all day under the sponsorship of J. S. Boardwell, California Electric Power Co., Riverside, with the following program:

1. Clearing accounts—their function and distribution—C. W. De Voe, San Diego Gas and Electric Co., discussion leader.
2. Accounting for temporary facilities installed to meet military and other governmental requirements—A. R. Cox, San Diego Gas and Electric Co., discussion leader.
3. Company manuals—their form and content, preparation and revision—A. J. Gudgell, Southern California Gas Co., Los Angeles, discussion leader.
4. Modern internal auditing—newest concepts of an important accounting function—F. C. McLaughlin, Southern California Edison Co., Los Angeles, discussion leader.

The purchasing and stores group will also meet all day under the sponsorship of J. K. Uhler, Southern California Edison Co., Los Angeles, with the following program:

1. Salvage and rehabilitation of materials, discussion leader, R. E. Fritzer, San Diego Gas and Electric Co.
2. Accounting for materials and supplies, discussion leader, H. E. Cox, Southern California Edison Co., Los Angeles.
   (a) Stock ledger records.
   (b) Materials charged direct upon receipt.
3. Round-table discussion of purchasing and stores problems.

The balance of the section will meet jointly from 9 a.m. to 12 noon for a round-table discussion of personnel problems under the sponsorship of the personnel group headed by R. G. Kenyon, Southern California Edison Co., Los Angeles. From 2 to 3 p.m., there will be a talk by a qualified speaker on the subject of employee relations. From 3 to 5 p.m., the personnel group will meet separately to discuss details of personnel department operations, while the credits and collections group and the customer relations group will meet together for a general discussion of their problems.

In keeping with the practice to rotate the annual meeting between the northern and southern conferences, the annual meeting this year will be held in conjunction with the Los Angeles conference when members, among other things, will ballot upon the officers for the new administrative year starting July 1. The report of the nominating committee will present the following candidates:

President, K. M. Ryals, Stone-Ryals Electric and Mfg. Co., San Francisco; directors, D. E. Harris, vice-president, General Electric Supply Corp., San Francisco; W. C. Mullendore, president, Southern California Edison Co., Los Angeles; George C. Tenney, president, McGraw-Hill Co. of California; Albert Cage, general manager, California Electric Power Co., Riverside; Richard Arbogast, Newberry Electric Corp., Los Angeles; M. G. Sanders, general sales manager, Central Arizona Light and Power Co., Phoenix; A. D. Brown, district manager, Allis-Chalmers Mfg. Co., Los Angeles; F. A. Tracy, president, Sierra Pacific Power Co., Reno; D. D. Smalley, PG and E, San Francisco.

The newly elected directors will join those on the board whose terms have one more year in duration: Harry L. Harper, Pacific district manager, Graybar Electric Co., Los Angeles; A. E. Wishon, vice-president and general manager, PG and E, San Francisco; H. H. Courtright, president, Valley

Two reasons why Essex EXTRA-TEST MAGNET WIRE is ideal for Coil Winding

Essex *Extra-Test* Magnet Wire is carefully and thoroughly tested for softness and "stretch" before shipment from the factory.

All flat, square, and heavy round wire is given the Rockwell Test. Round wire in intermediate and smaller sizes is subjected to Elongation Tests. In every case, Essex demands results better than ordinary specifications require.

These constant, severe Essex *Extra-Tests* give definite assurance that every spool of this fine magnet wire will be soft enough—sufficiently annealed for ideal "wind-ability" in coils. No more hard, springy wire to cause trouble and slow up production. No more annoying complaints and adjustments.

Essex also uses the most modern methods of spooling wire—and all essential data (size, weight, insulation) is plainly indicated on the label of every spool. This prevents costly errors in your warehouse and winding room.

ESSEX WIRE CORPORATION
FORT WAYNE 6, INDIANA

Electrical Supply Co., Fresno; I. W. Borda, Pacific Coast manager, the Okonite Co., San Francisco; H. H. Cleland, president, San Diego Gas and Electric Co.; Walter G. Willson, Los Angeles manager, Westinghouse Electric Corp., Los Angeles; M. G. Sues, general manager, Sues-Young Co., Los Angeles; A. G. Jones, district manager, General Electric Co., San Francisco; Charles Grunsky, chief engineer, Coast Counties Gas and Electric Co., Santa Cruz; R. R. Walbridge, vice-president, Southern California Edison Co., Los Angeles.

Industrial Seeing

Better appreciation of "the human eye and industrial visual problems" came to the members of the Oregon Chapter, Illuminating Engineering Society, after its special meeting March 30 at which the speakers were Dr. Leighton E. Roy, Opt. D., visual consultant for a number of industrial concerns, assisted by Dr. Frank Bemis, Portland, president of the Oregon Optometric Assn., and George Lewis, safety engineer of Portland Gas & Coke Co. D. O. Bergey, chairman of the chapter, presided and C. T. Bakeman, regional IES vice-president, Puget Sound Power & Light Co., Seattle, also participated. So important was considered the paper presented by Dr. Roy that it was mimeographed completely and circulated among the members of the chapter.

Speaking first to differentiate between the oculist, optometrist and optician, Dr. Roy then gave a description of the eye itself and its functioning and the method by which seeing takes place. He then discussed industrial seeing tasks and showed how valuable it would be if a visual survey could be made in each plant along with the formulation of job specifications. As an example he described the visual task of a crane operator as differentiated from that of a welder and illustrated how his seeing task requires a different set of conditions and visual correction.

George Lewis discussed the factor of ability to see in relation to accidents and described the fitting of employees with safety glasses. Dr. Roy continued to discuss safety glasses and the necessity for proper adjustment of them and went on to show the need for adequate illumination because without it no matter what correction was made in glasses the worker could not see.

Dr. Bemis discussed the progressive strain upon eyesight during a lifetime and then showed methods for improving muscular coordination and with it improving eyesight. Dr. H. H. Loy, Forest Grove, likewise demonstrated the testing of perimetry and showed its importance in the safety of an employee surrounded by many accident hazards.

At the beginning of the meeting Bakeman, prior to his trip East to the IES council meeting, asked for suggestions and was given a number.

Induction Heating

An actual demonstration of electronic generation for industrial heating by high-frequency current was conducted by H. N. Skow and R. Bollaert of the engineering and service department, Westinghouse Electric Corp., for the May 10 meeting of the Electrical Maintenance Engineers' Assn. of Northern California. Skow presented the theory of operation and Bollaert conducted the experiments to illustrate its operation.

At the election of officers, held at the same meeting, Ross Manseau, Bethlehem Steel Co., was elected president, and Philip Stoltz, U. S. Army port of embarkation, Oakland, vice-president; Tone Gray, Pacific Telephone & Telegraph Co., secretary-treasurer.

Previous meeting was held at the American Can Co. plant, under auspices of John Hayes, the immediate past president of the association.

R. Bollaert and H. N. Skow of Westinghouse, demonstrate induction heating equipment to the Electrical Maintenance Engineers Assn. of Northern California

So. Cal. Inspectors

If the Southwestern Section, International Association of Electrical Inspectors, is unable to hold its annual meeting late in August or early September as planned, the Southern California Chapter may hold a meeting for southern California members of the section on one of those days. This came out in the process of discussion at the May 2 meeting of the Southern California Chapter, IAEI, at Long Beach, Calif., presided over by Jesse Ross, of San Bernardino. It was also decided to hold an extra meeting in July at South Gate.

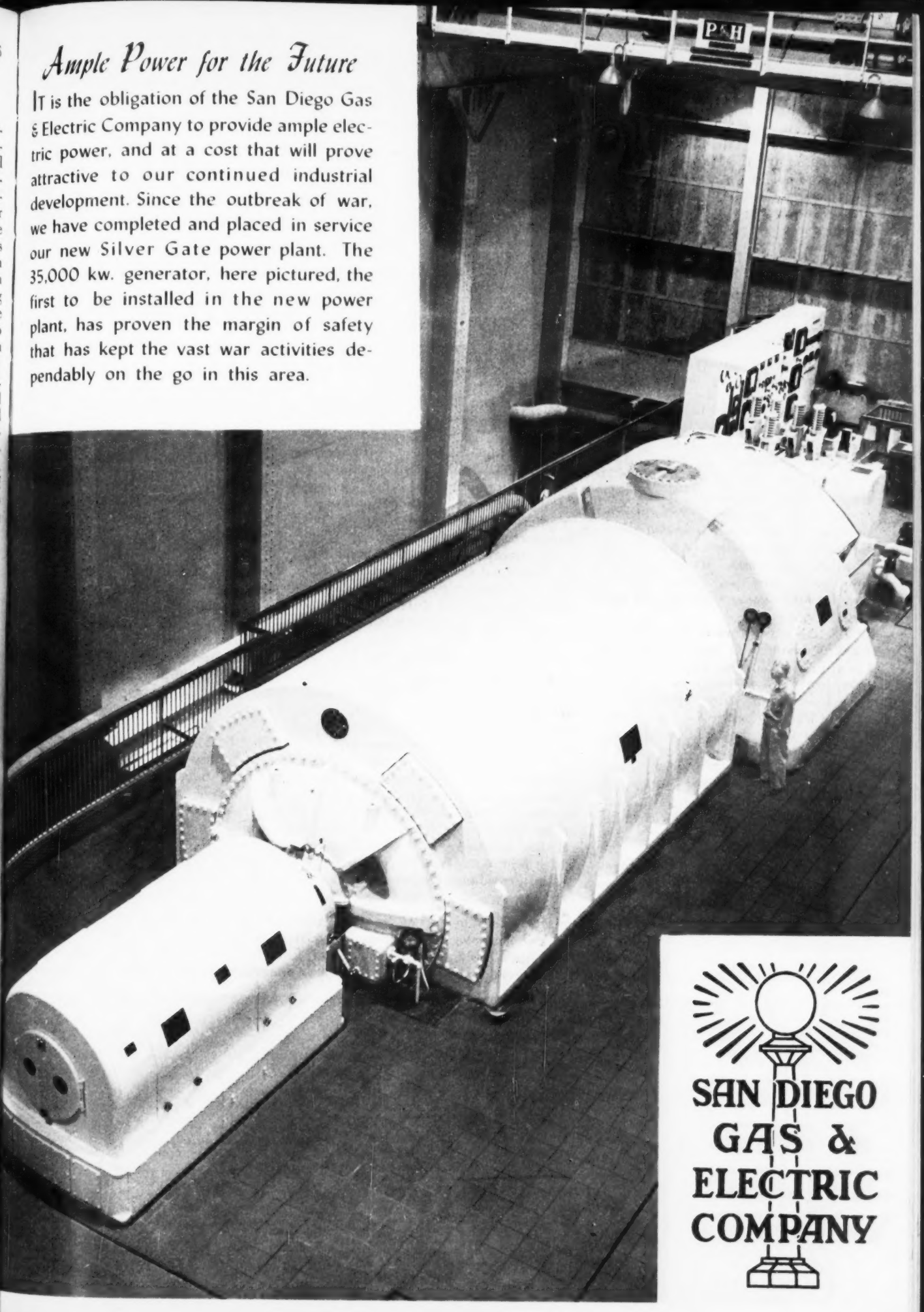
Among the numerous subjects covered at the meeting was a proposed commercial standard for prefabricated homes which was submitted for discussion by V. W. Hartley, managing director, Pacific Coast Electrical Assn. Opinion was expressed that wiring of prefabricated homes should conform to local regulations of the places in which the homes may be erected.

Kenneth D. Harrington, application engineer, Cutler-Hammer, Inc., discussed postwar difficulties of the electrical inspector with a possible 5,000 new appliance manufacturers selling equipment to an appliance-hungry public, 10,000 new electricians turned loose on the world and only a handful of inspectors and an outdated code book to work with. Henry C. Rice, manager domestic sales, Southern California Edison Co., presented A. B. Smedley, who gave a talk on power factor and how it affects the inspector. Rice also mentioned specifications being prepared to supplement the wiring in houses built under the war housing restrictions in order to bring them up to adequacy.

● *Electrical Equipment Repairing* was presented in three phases by the R. A. Reed Electric Co. personnel at the May 16 meeting of the Electrical Maintenance Engineers Assn. of Southern California. Various operations of motor repair procedure were first amply discussed and illustrated with the use of slides, by C. W. Doane. George Larsen, electrical engineer for the firm, gave a talk on engineering problems encountered when original design is altered to suit specific applications. He stressed the value of having all pertinent information relating to the application and knowing the conditions under which the motor under repair will be operated in order to do a satisfactory job. William A. Hogue discussed the relationship between the electrical maintenance department, such as represented by most of the membership of the association, and the electric repair shop, such as his own company.—Henry Bush, publicity chairman.

Ample Power for the Future

IT is the obligation of the San Diego Gas & Electric Company to provide ample electric power, and at a cost that will prove attractive to our continued industrial development. Since the outbreak of war, we have completed and placed in service our new Silver Gate power plant. The 35,000 kw. generator, here pictured, the first to be installed in the new power plant, has proven the margin of safety that has kept the vast war activities dependably on the go in this area.



SAN DIEGO GAS & ELECTRIC COMPANY

Estimators First Year

In celebration of its first full year of operation after formal organization, the East Bay Electrical Estimators Club, of Oakland, invited the Electrical Contractors Assn. of Alameda and Contra Costa Counties to attend its anniversary last month. Larry Hyde, chairman of the organization, reviewed the history of the formation of estimators group, outlined its purposes and described its membership.

Officers for the first year were Larry Hyde, president; Al Hiester, vice-president; Walter Riley, secretary and Lawrence Hultgren, treasurer. The organization, he said, meets each Thursday noon and has an entirely educational program. The electrical inspection department meets with it once a month and discusses Code problems. Contact has been established with other estimators clubs throughout the country for the exchange of ideas and data.

One of the important committees appointed recently was that on estimating methods and procedure, of which E. R. Cornish is chairman. Its purpose is to improve the quality of estimating done and to study various forms and data on estimating.

Election of officers at a subsequent meeting resulted in naming of E. R. Cornish, Matson Electrical Equipt. Co., president; Roy Simmerly, T. L. Rosenberg Co., vice-president; John Brombach, Clifford Electric Co., secretary; Lawrence Hultgren, Clifford Electric Co., treasurer; and as directors, Walter Riley, Spott Electric Co.; Larry Hyde, T. L. Rosenberg Co.; E. A. Chlaupek, California Electric Co.; and Arthur Sousa, Pacific Electric Motor Co.

● W. D. VANCE, JR. was elected president of the Electrical Contractors Assn. of Alameda & Contra Costa Counties at its annual meeting April 30. Al C. Weber was elected vice-president and T. L. Rosenberg secretary-treasurer. To complete the board John Brumback and E. L. Buttner were elected. At the May 16 meeting T. L. Rosenberg was appointed chairman of the postwar planning committee; Louis H. Spott, chairman of the labor relations committee and C. D. Bronson, chairman of the apprenticeship training committee.

Dan Tracy Speaks

Two things made the May 3 meeting of the San Francisco Chapter, National Electrical Contractors Assn., a notable event. First, Dan Tracy, former president of the International Brotherhood of Electrical Workers, now Assistant Secretary of Labor at Washington, D.C., and a delegate consultant representing the Labor Department at the United Nations Conference of International Organizations in San Francisco, spoke to the group. Secondly, George Abbett, past president, was presented with an engraved and illuminated leather-bound book paying tribute to his efforts during the several trying years when he directed the association.

Dan Tracy was introduced by Charles Foehn, business manager for Local No. 6, IBEW, with which the San Francisco Chapter has a union agreement. Tracy talked on the relationship between contractors and electrical workers and discussed several of the postwar problems which both must face together. Among these were total employment, apprenticeship training for the returning veterans. He likewise answered questions relative to annual wages and policy which were put to him by the members.

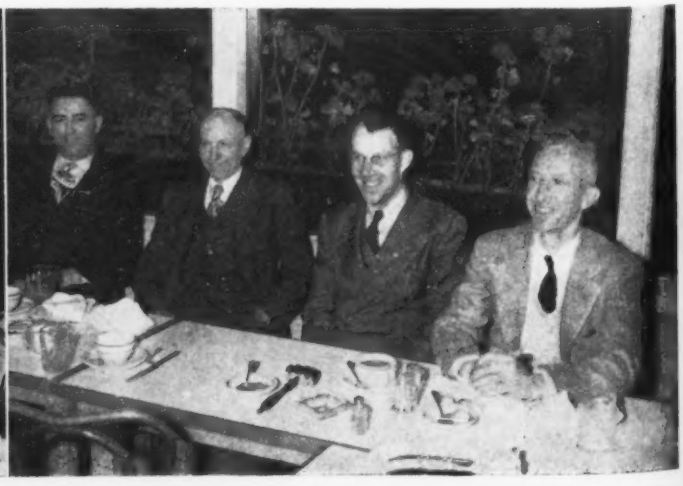
President James Galvin called upon Clyde Chamblin to make the presentation to George Abbett. Abbett responded, thanking the members for the gift of their friendship which meant more to him, he said, than anything they could have given. Chamblin paid tribute to him for his staunchness in holding the association together to fight through the indictment which had been placed on the association and winning the battle.

The San Francisco Chapter is newly formed and succeeds the San Francisco Electrical Contractors Assn., Inc. It was necessary to nominate a governor for the chapter to represent it on the NECA board. George Abbett was nominated and unanimously elected for this post. William J. Varley, who for some years was association representative, has been engaged as manager for the chapter. He resigned from the NECA field staff, on which he has served for the past three years for the eleven Western states.

NECA Field Service

A request made to the National Electrical Contractors Assn. through resolutions adopted at a joint meeting of directors from the Northern California and Los Angeles chapters in Fresno April 21 has been denied by the NECA executive committee. This request was that field service work for the West be assigned to the chapter managers for the area adjacent to those chapters rather than employment of a new field representative for the entire eleven Western states. NECA turned the request down on the basis that such a plan would restrict the formation of new chapters and not render service to areas where there was a possibility for a chapter but which were remote from already established chapters.

Celebrating the first anniversary, the Estimators Club of Oakland invited their bosses to lunch. Larry Hyde, above right, president, reports on the year's work. At head table, left, was Walter Riley, secretary, T. L. Rosenberg and Lou Spott, two contractors. In the right hand picture, the executive committee, Arthur Sousa, Al Hiester, vice-president, Hall Sloat, E. R. Cornish, now elected the new president of the club. Meetings are held each Thursday noon.



For HOT SPOTS use "Nasbestus" WIRES and CABLES

A name to remember for installations where heat, flame, oil, moisture, grease and corrosive fumes prevail, and where rubber, Neon (thermoplastic) and varnished cambric insulations are unsuitable.

Illustrated are two examples from our wide range of asbestos and asbestos-varnished cambric insulated wires and cables. Literature and complete engineering data on request.

NATIONAL ELECTRIC PRODUCTS
NEPSI WIRING 6 SYSTEMS
WIRES AND CABLES

ALL ASBESTOS WIRE AND CABLE

Sizes No. 18AWG to 1,000,000 CM.—For wiring rheostats, stoves, switchboards and electrical equipment exposed to heat or fire hazard. Also for general open wiring in hot locations. 300 and 600 volt ratings. Max. operating temperatures 200°C (392°F) and 125°C (257°F) respectively.

ASBESTOS-VARNISHED CAMBRIC CABLE

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NEWS of the industry

ELECTRIC COMPANIES FAVORED IN SURVEY

Eighty-six per cent of the electricity users in Clark County, Wash., replying to a postcard poll, said they liked their present electric service organization, and wanted it to continue serving them. The other 14% of the replies said they would rather be served by the PUD and favored taking over the electric company by condemnation.

The poll was occasioned by the filing on April 6 of a condemnation suit by the Clark County PUD to condemn the electric distribution lines of Northwestern Electric Co. serving a large part of the county, both the towns and rural areas. Condemnation suits also have been filed against Pacific Power & Light and Portland General Electric companies.

A widespread expression of disapproval by customers and the public generally led Northwestern to undertake the poll, which was conducted by mail with a return postcard requiring no signature.

Recipients of the ballot, some 13,000 electric customers of the company, were asked to mark one of two statements: "I like my present electric service organization, and want it to continue serving me"; and "I would rather be served by the PUD and favor taking over your company by condemnation." In ten days after mailing, 4,226 cards had been returned. Of these, 3,639, or 86%, voted against condemnation. In the city of Vancouver and nine smaller towns, the vote was 87.5% against condemnation. In the rural areas, it was 81%. The first ten days returns represented about one-third of the recipients of the ballot.

Five-Point Plan for Hetch Hetchy Power

Continuing its efforts to dispose of Hetch Hetchy power, the city of San Francisco last month submitted a five-point program to the California Railroad Commission and the Interior Department. Previous disposal plans have been rejected by the Interior Department on grounds that they did not comply with terms of the Raker Act.

The new plan involves: 1. Use by the city of Pacific Gas and Electric Co. distribution facilities, through lease and other payment plans. 2. Use by the city of Hetch Hetchy power for municipal needs. 3. Acquisition by the city of PG and E's contract to serve Kaiser's Permanente works at Los Altos. 4. Acquisition of the private company's contract to supply power to the Modesto-Turlock irrigation district. 5. Sale of any surplus power to PG and E as dump power.

Compliance with the Raker Act will mean a cut in San Francisco's Hetch Hetchy power sale revenues of at least $1,852,000 in the next 8½ years, with a possible additional $1,400,000 being lost if the city's latest contracts fail to meet approval of the Interior Department.

Under the outlawed PG and E contract whereby San Francisco sold all its Hetch Hetchy power to the private company, revenue amounted to $2,400,000 annually. But in selling to proposed new customers—municipality of San Francisco, Permanente magnesium and cement works, Aluminum Co. of America and Turlock-Modesto Irrigation District—the city must enter the competitive power price market and sell at a lower rate.

If sale of dump power to PG and E is not approved, the city will lose the additional $1,400,000 during the life of the contracts.

FPC Denies Rehearing in Montana Accounting Case

Adhering to the "cost" concept of accounting, FPC denied an appeal by Montana Power Co. for rehearing on an order issued last February and calling for accounting adjustments totaling more than $51,000,000. The company petition was joined in by American Power & Light and the $6 preferred stockholders.

Commenting on the fact that the FPC order was at variance with an earlier order of the Montana Public Service Commission, the federal commission pointed out that its system of accounts is rooted squarely in the "cost" concept and that it rejected "values" figures submitted by the company and accepted by the state body.

● REQUEST by the Washington Water Power Co. that the Washington Supreme Court hold up its remittitur in the Okanogan PUD case for 30 days pending application for rehearing was denied, 6 to 3. Plan of the PUD to take over the companies properties immediately was announced by Manager Paul W. Hand following decision of the court to dismiss action to enjoin the district from issuing bonds in excess of condemnation valuation. (E. WEST, May, p. 102.)

REA BACKLOG IN WEST EXCEEDS 13 MILLION

Approximately $13,300,000 in allotted REA loan funds is available in the eleven Western states, it was reported from REA headquarters in St. Louis, following "go-ahead" instructions from Acting Administrator William J. Neal. REA funds totaling $100,000,000 nationally, were freed when WPB amended order U-1 to allow construction of minor plant additions without specific approval, where the net material cost does not exceed $25,000.

The total in the West represents the difference between approved loan allotments and amounts actually advanced by REA, it was explained. The figure includes loans allotted for transmission equipment and for relending to individuals to finance wiring of their premises and plumbing installations. Only distribution line construction is eligible under the new WPB order, it was pointed out, and funds will be advanced as rapidly as needed to pay for materials and construction costs.

Stating that the agency faces the biggest power line construction job in history, Neal explained that more than 900 REA financed systems are affected by the order and that the $100,000,000 backlog represents the difference between $522,000,000 which has been allotted as loans for specific projects from funds authorized by Congress and the $420,000,000 actually advanced. Applications are being received already for loans from the $80,000,000 fund authorized by Congress for the next fiscal year, he stated.

Latest available figures on the approximate amounts of loan funds upon which REA borrowers may draw for payment of materials and construction costs on line construction jobs, are: Arizona, $175,000; California, $800,000; Colorado, $3,750,000; Idaho, $800,000; Montana, $1,000,000; Nevada, $30,000; New Mexico, $950,000; Oregon, $2,150,000; Utah, $300,000; Washington, $2,250,000 and Wyoming, $1,100,000.

● VOTERS of Salem, Ore., who a few months ago rejected a proposal to grant a franchise to Salem Electric Co-operative, will vote on the question again June 22. The former proposal called for a general franchise, but the present request is limited to 30 blocks in the business district, including the 22 blocks in which the cooperative now operates by virtue of a 20-pole permit.

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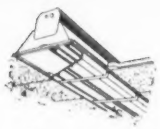

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ICKES REPORTS COSTS ON COLUMBIA BASIN PROJECT

Revenue from power will repay three fourths of the total $487,000,000 cost of the Columbia Basin project within 75 years according to a program reported to Congress by Interior Secretary Harold J. Ickes. Receipts from water would repay the remainder except for $1,000,000 chargeable to flood control.

Estimated costs for the completed projects are as follows: Grand Coulee Dam and reservoir, $126,400,000; Grand Coulee power plant and facilities, $79,900,000 and Columbia Basin irrigation facilities, $280,782,000. Up to June 30, 1944 a total of $175,005,533 had been spent on the project for the dam and reservoir and approximately half of the power installation.

The report also allocates the estimated construction costs for the completed project as follows: Irrigation $341,900,000; development of commercial power, $113,800,000; river regulation, $30,300,000 and flood control, $1,000,000. Of the total, $348,000,000 will be repaid out of commercial power revenues.

City Makes Payment on Boulder Dam Equipment

Advance payment of $8,000,000 to the U. S. Bureau of Reclamation was authorized by the Los Angeles Board of Water and Power Commissions May 22 to apply on the Department of Water and Power's obligation to repay costs of generating machinery and equipment at Boulder Dam power plant.

Available cash in the power revenue fund will enable payment of 14 yearly installments without issuance of bonds. Elimination of the 3% interest on the annual payments will result in savings estimated at $1,925,000.

"The annual installment for amortization of generating machinery allocated to the municipal system, plus annuity for replacement, runs approximately $712,000 at the present time," said Edward A. Dickson, the board's finance committee chairman. This figure includes the interest which will be eliminated by the advance payment.

● Bids for clearing the right of way for the 42-mile Albany-Toledo Bonneville transmission line in Oregon are being accepted by the Bonneville Power Administration. Power will be supplied to the state's largest PUD in Lincoln, Lane, Coos and Douglas counties, now served largely by generators at a Toledo sawmill, which will be maintained for stand-by service.

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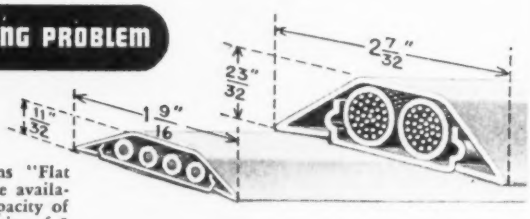

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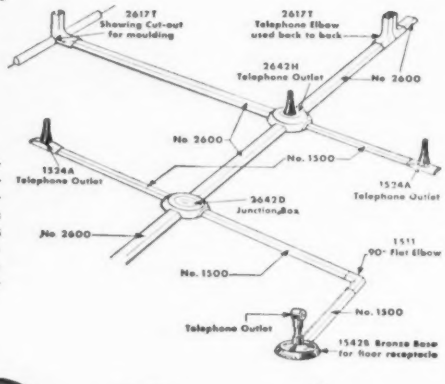
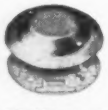
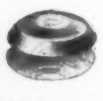


1524 Telephone Outlet

1542B Receptacle Base


1542D Junction Box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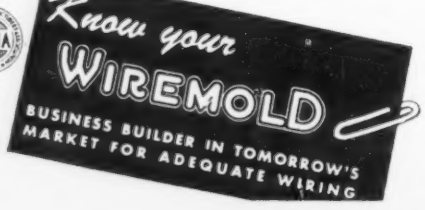


INTERIOR APPROPRIATION DEBATED IN CONGRESS

Following three days of heated debate, the House passed almost without change the Interior Department appropriation bill for fiscal 1946, lopping off budget bureau estimates for Bonneville, Central Valley and the USBR. The bill had still to go to the Senate, which might restore the reductions before passage.

As passed by the House, the bill calls for appropriations of $101,242,628, a reduction of $40,103,419 below budget estimates. The bill made available to BPA $3,487,110 for marketing operations and administrative costs. The funds are to come from unobligated balances. Language proposing to include the Hungry Horse dam authorized for construction on the south fork of Montana's Flathead River was eliminated from the bill. In the absence of WPB approval for any item of the proposed $15,811,000 construction program, no funds were specifically provided. BPA will have an estimated $13,000,000 of unobligated balance available for any projects that may be approved.

The Reclamation Bureau appropriation was cut $16,114,000 from a budget estimate of $44,842,000. In connection with Hungry Horse project, the committee allowed only sufficient funds for specified plans preliminary to construction. It disallowed an estimate of $500,000 for extension of the government-owned transmission line from Brush to the Sterling-Holyoke area of Colorado in connection with the Colorado-Big Thompson project.

Bitterly contested was a reduction of $1,000,000 in the Central Valley construction fund. The committee specifically disapproved items of $115,300 for planning the Delta Steam Plant, successor to the Antioch Steam Plant in the San Francisco Bay area, which was fought over early in the war. It also disapproved $100,000 for planning transmission lines and switchyards to move Shasta Dam power to load centers. Public power members charged that these cuts would hamstring the entire Central Valley project by making the Pacific Gas and Electric Co. sole customer for Shasta power. Committee members defended the report which noted, "It is the intention of the committee that none of the funds appropriated in this bill or heretofore appropriated shall be used for any purpose in connection with the establishment of a steam plant or a transmission system." They pointed to the existing contract for Shasta energy between the Interior Department and PG and E and said the contract had been

termed entirely fair by the Interior Department.

"Under these conditions," the committee report went on, "it is unnecessary for the government to appropriate funds to construct a steam plant estimated to cost $26,000,000 or a transmission system which would cost approximately $43,000,000 which would not produce greater returns to the government. There is no unserved market in the area. The proposed steam plant and transmission system would duplicate if not destroy existing tax-paying facilities and take much valuable property off the tax rolls to the detriment of many towns and counties in the state of California."

Five-State Group Opposes Columbia Valley Authority

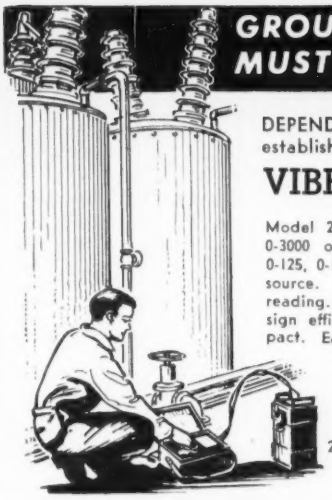
With opposition to the proposed Columbia Valley Authority as one of its aims, the Pacific Northwest Development Assn. has been organized in Portland. The association is made up of representatives from Oregon, Washington, Idaho, Montana and Wyoming.

The association would substitute for a federal authority, a program for effective partnership of local, state and federal agencies in development of power, irrigation, flood control and navigation projects. Support has been pledged postwar projects calling for expenditure of more than $250,000,000 within the jurisdiction of the Portland District Army Engineers.

Officers of the association are: J. C. Compton, Oregon, president; Dean Johnson, Oregon, Tom Potwin, Washington, J. L. Driscoll, Idaho, L. A. Colby, Montana, Clifford Hansen, Wyoming, vice-presidents; David B. Simpson, Oregon, treasurer; A. L. Atherton, Washington, secretary.

● FPC has announced consolidation of its engineering activities in a single bureau to be known as the Bureau of Power. Headquarters are in Washington, D. C., and field offices in San Francisco, Fort Worth, Atlanta, Chicago and New York. E. Robert de Luccia, former Lieutenant Colonel of Engineers, is chief of the bureau and John C. Beebe is acting head of the San Francisco office.

● AN $88,708 CONTRACT for carrier communication equipment has been awarded by Bonneville to General Electric Co. The equipment will be used to tie in the new Columbia substation near Rock Island, Wash., with the rest of the Bonneville-Grand Coulee system. Most of the equipment will be installed in Columbia substation now under construction and the balance will be placed at Covington and Midway substations.



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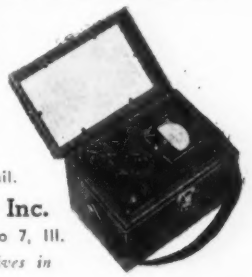

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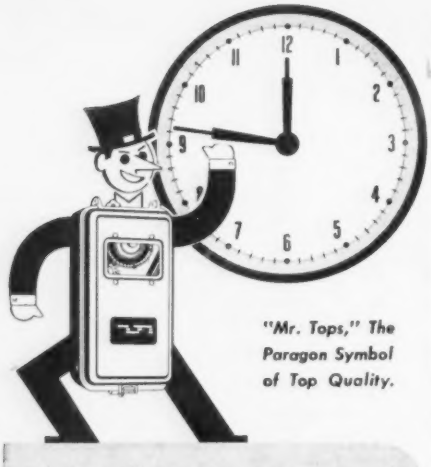

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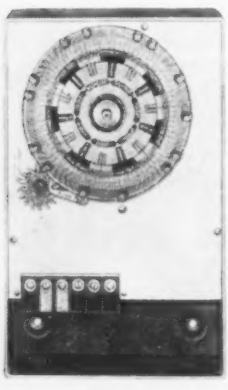

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TACOMA MAY TAKE OVER NISQUALLY CONSTRUCTION

Under consideration last month by the city of Tacoma was a proposal that the city take over work on the $23,000,000 Second Nisqually project and complete the job with its own resources.

Suggestion came from Utilities Commissioner C. A. Erdahl, who said his recommendations were prompted by a desire to protect Tacoma's financial interests. Completion of the project has been delayed by a series of mishaps. Erdahl told the Board of Contracts and Awards, to whom he submitted his plan, that every month of delay costs the city between $60,000 and $70,000.

If the plan is accepted, the West Construction Co. would be relieved of responsibility for completing the work on the mile-long Nisqually tunnel, recently damaged by a landslide. The alternative would be to permit the company to complete the work and receive 15% above costs.

Portland Companies Make Another Rate Dividend

Portland General Electric and Northwestern Electric companies will discount electric bills 20% for the one-month period from May 23 to June 23, as a means of passing on to customers excess wartime earnings. The "dividend" plan has been accepted by the Oregon Utilities Commissioner and the Washington Department of Public Utilities as a means of taking care of a temporary condition requiring a rate adjustment but not a permanent rate reduction.

Estimated reduction under the plan is $200,000 for Portland General and $77,000 for Northwestern. The same plan was followed by the two companies last year.

● MONTANA customers of Montana-Dakota Utilities Co. will realize savings of about $110,000 annually as the result of a new rate schedule for the company approved recently by the Montana Railroad and Public Service Commission and effective May 1. Reductions amount to 20% for residence rates, 18% for commercial rates and 15% for industrial power rates.

● REA loan allotments have been made to the Escalante Valley Electric Assn., Modena, Utah, and to the Douglas PUD in Washington. The former was granted $100,000; the later $33,000, including $25,000 for additional acquisition costs and $8,000 for working capital.

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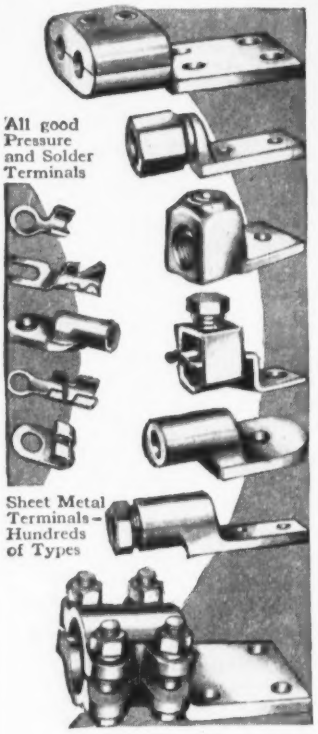

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You'll like to use G-E White Rigid Conduit. It is uniform . . . is easy to handle . . . has accurate threads. Its smooth interior surface aids wire pulling. Your customers will like this conduit too. It will give permanent protection to their wiring regardless of where it is installed. It is resistant to heat, flame, cold, moisture, gas, alkalies and mechanical injury.

G-E White Rigid Conduit is heavily zinc coated inside and out by immersion in molten zinc—the hot-dipped galvanizing method. This method provides the most durable coating of pure zinc that can be applied by any process. In addition, G-E White has a coating of baked Glyptal inside and out. Another G-E conduit, G-E Black, is also available. This conduit is enamel coated and is recommended for interior use where exposed to chemical corrosion.

FOR FURTHER INFORMATION on G-E conduits, building wire or wiring devices, see the nearest G-E Merchandise Distributor or write to Section CDW451-8, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

Reg. U.S. Pat. Off.

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GENERAL ELECTRIC

Hear the G-E radio programs: "The G-E All-girl Orchestra," Sunday 10 p.m. EWT, NBC; "The World Today" news, Monday through Friday 6:45 p.m. EWT, CBS; "The G-E Houseparty," Monday through Friday 4:00 p.m. EWT, CBS.

Eliminate THE HAZARDS OF EXPOSED ELECTRICAL CONDUCTORS

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Readily installed on ALL TYPES OF Electrically Operated

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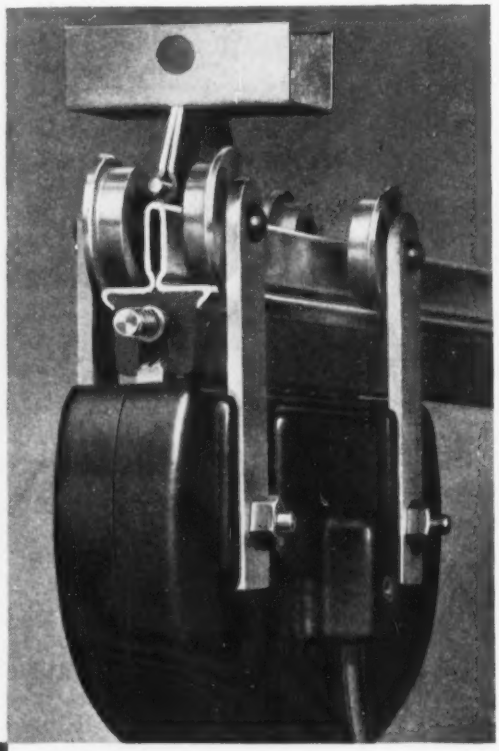
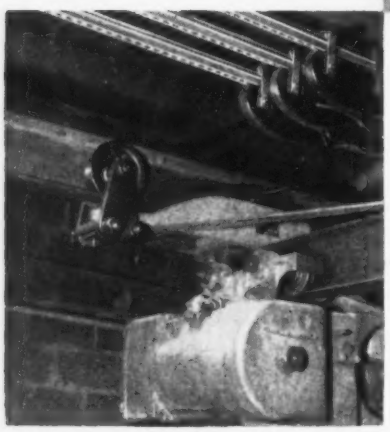
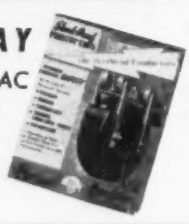




Why not thoroughly investigate the multiple savings and advantages to be secured by removing the possibility of costly accidents and fire hazards, resulting from *exposed* electric trolley wires in and around your plant. Start your investigation, today, by looking into the fully rubber-insulated TRAC TROLY System, designed for single or multiple phase A.C. or D.C. circuits up to 600 Volts. This protection is not only economical but yields large returns in increased production efficiency, lower maintenance costs and reduced compensation rates with higher earned dividends Get full particulars without delay.

WRITE TODAY
For your copy of TRAC TROLY SAFETY Bulletin No. 201



RUBBER **BENBOW** INSULATED **TRAC TROLY**

BENBOW MANUFACTURING COMPANY
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PASADENA TO SERVE CIT WIND TUNNEL

Electricity to operate the $2,500,000 wind tunnel at the California Institute of Technology will be sold wholesale by the Pasadena, Calif., municipal light plant. Described as the world's most advanced wind tunnel, the unit was built by Consolidated Vultee, Douglas, Lockheed and North American aircraft companies.

Dedicated May 13, three years after design studies began, the tunnel will test with air speeds up to 750 miles per hour developed by the fan system driven by a two-element electric motor-set with a peak rating of 12,000 hp.

Basic drive unit of this set is a variable-speed direct-current motor supplied through a separate motor generator which is made up of a variable-voltage d-c generator directly coupled to and driven by an a-c motor of the synchronous type. These three machines, comprising the d-c system, have a top rating of about 2,000 hp. at 570 r.p.m.

Power requirements beyond the capacity of the d-c system are supplied by an a-c variable-speed, induction motor having a wound rotor and slip rings and a short-time capacity of 10,000 hp.

Service is brought to the laboratory underground through a 17,000-volt cable. At the wind tunnel substation, the voltage is stepped down to 2,300 volts for use in the main machinery and in a separate transformer bank is reduced to 440 volts for auxiliaries and for local transformers for small power and light circuits.

● SEATTLE CITY COUNCIL has granted permission to Superintendent of Lighting J. D. Hoffman to pay $37,779 toward a large oil type circuit breaker being constructed for the Bonneville Power Administration. Hoffman told the council that City Light was obligated, under terms of an agreement with Bonneville officials, to return a 2,500,000-kva. circuit breaker on loan from that agency. In the meantime, however, Bonneville has decided that it no longer needs that type, but has ordered three larger circuit breakers. Payment by the city of $37,779 will be accepted by Bonneville in lieu of the return of the equipment, Hoffman reported.

● INTERMOUNTAIN Rural Electric Assn., Littleton, Colo., has awarded a $1,427 contract for labor on the construction of four miles of line. Materials will be furnished by the co-op. Contract was awarded to E. W. Reither, Englewood, Colo. Glenn R. Fickel of Denver is the engineer.

"I'm Ashamed to buy this War Bond"

● "Why should I be privileged to make a neat and certain profit from my contribution to our war effort?

"Here I sit, comfortable, well-clothed, well-fed . . . while in outlandish places with outlandish names the world around, youngsters—mine among them—face privation, disease, injury, and death—to keep my life well-ordered and undisturbed.

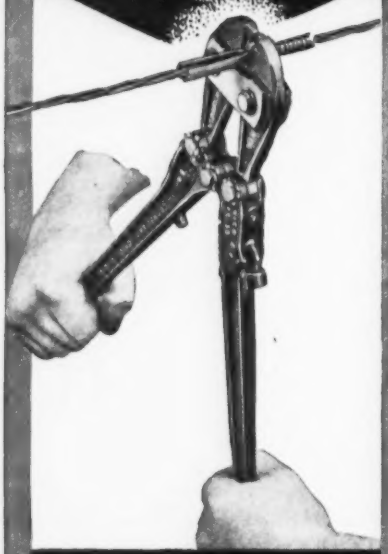
"The only sacrifice that's permitted me is to buy War Bonds beyond my means—and the more I buy, the bigger my eventual profit! It's a profit I blush to take, even though Uncle Sam has set it up that way. But I'm still ashamed!"

As with our entire production facilities—now with our advertising—Railley's energies are single-mindedly devoted to America's war effort.

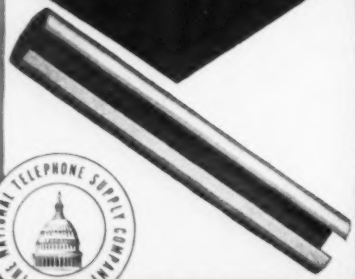
Railley
CORPORATION · CLEVELAND, OHIO
ORIGINATORS OF THE PIN-IT-UP LAMP

Now Making for Victory: X-RAY PARTS • GAS PROOF COVERS
ROCKET PROPULSION UNITS • DUMMY FUZES • PRACTICE CARTRIDGES

Nicopress
Reinforcing Sleeves are Specially Made for Strengthening Damaged
Copperweld–Copper Conductors



Nicopress Reinforcing Sleeves offer an ideal means of strengthening Copperweld-copper conductors at points where one or two of the copper wires have been damaged. These sleeves are split the full length and may be slipped over the damaged section and compressed with the same Nicopress Tool used in making the regular line splice.



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Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA
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BARGAINING AGREEMENT SIGNED BY BONNEVILLE

A dispute between Bonneville Power Administration and labor groups ended May 2, when Bonneville representatives and the Columbia Power Trades Council signed a collective bargaining agreement at Portland.

Under terms of the agreement, which affects various trades and crafts not governed by the 1923 Classification Act, bargaining machinery is set up to provide for joint determination of rates of pay, hours and working conditions. A system of apprenticeships, under the administration of a central joint council, is also established.

The agreement further provides for joint cooperative committees, which will consider such matters as "elimination of waste in construction and production; conservation of supplies, materials and energy; improvement of quality of workmanship and services; promotion of education and training; correction of conditions making for grievances and misunderstandings; encouragement of courtesy in the relationships of employees with the public; safeguarding of health and prevention of hazards to life and property; betterment of employment conditions and the strengthening of the morale of the service."

In addition to Dr. Paul J. Raver, Bonneville Administrator, and Robert B. Sheets for the Trades Council, signers of the agreement represented the teamsters', iron workers', steamfitters' and electrical workers' unions.

California Group Begins Veteran Training Program

Apprenticeship training for veterans has already begun in California under the California Veterans Committee and the division of Apprenticeship Training of the State Department of Industrial Relations. The veterans committee was appointed by Governor Earl Warren. Work has already started under this sponsorship to bring together groups of employers and unions and to work out apprentice agreements on a standard form which will provide pay for veterans taking apprenticeship training on a scale based on a percentage of journeyman's wages. This, together with his $50 a month training allowance from the government under the G. I. Bill of Rights, would provide a reasonable living income during the training period. A booklet giving the details of the program has been prepared by the California Apprenticeship Council, of which Archie J. Mooney, 515 Van Ness Ave., San Francisco 2, is the secretary.

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Wired heat
PRODUCTS

ELECTRIC HEATING SYSTEMS
(automatic) unit heaters for large or small homes, apartments, stores, etc.

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(automatic) three types—built-in wall, bracket, portable. Many sizes, models, finishes.

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for hotels, restaurants and institutions.
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All types of Electric Equipment for HEATING AIR or WATER standard or special

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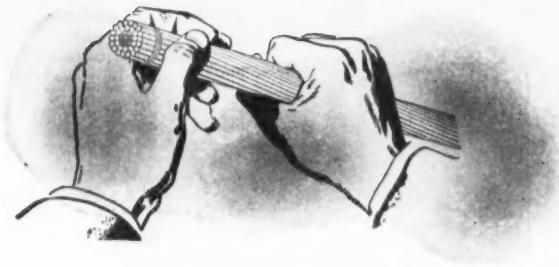
PORTLAND . . . . 103 N.W. 14th St.

ALCOA A-C-S-R

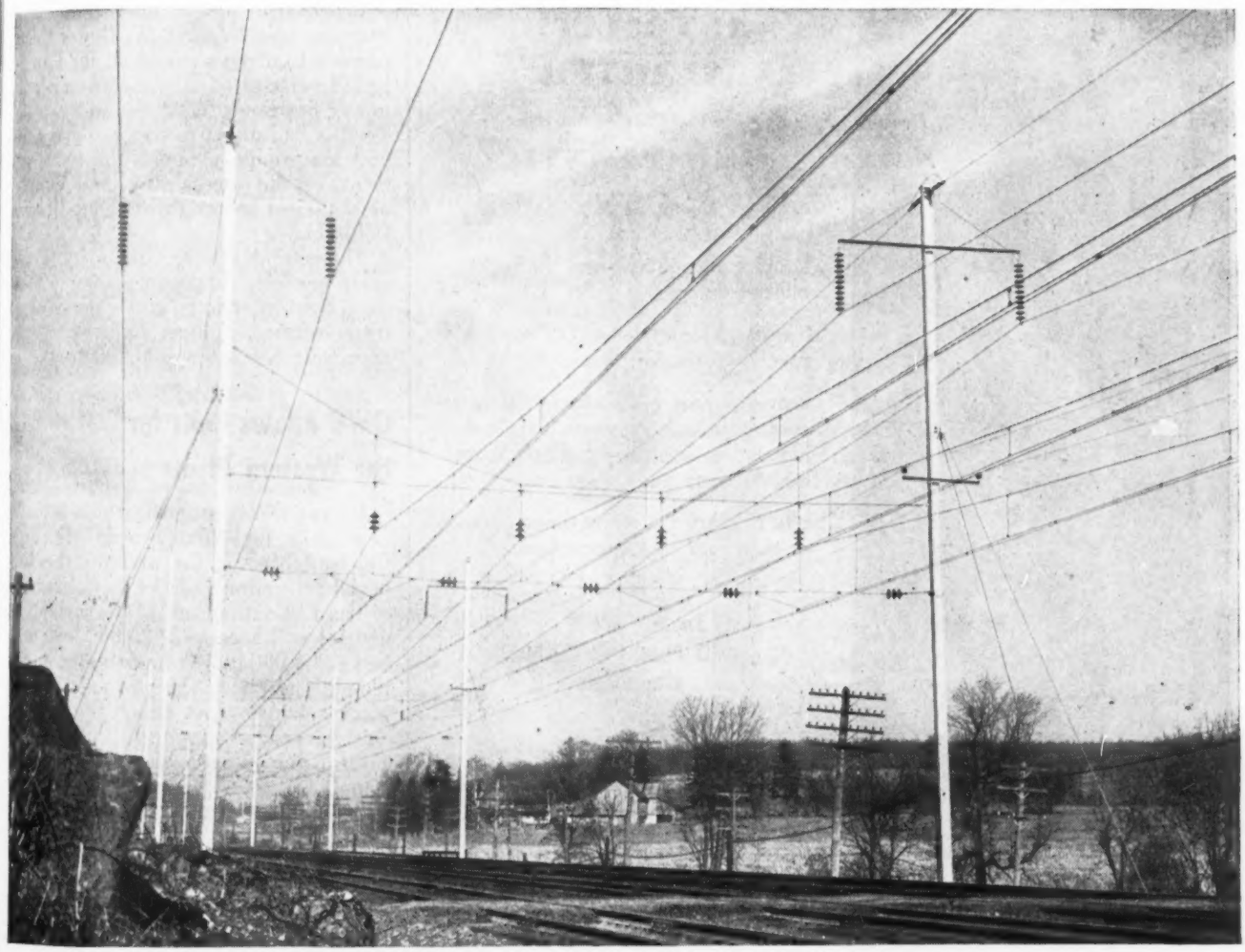


One of the most dependable conductors of electricity on the Pennsylvania Railroad

This conductor is always on the job . . . always ready for service . . . always dependable . . . it's the Alcoa A.C.S.R. (Aluminum Cable Steel Reinforced) used on the Pennsylvania Railroad between Paoli and Enola.

Aluminum wires around a core of steel provide the combination of high current carrying capacity, high strength and dependability so important in the operation of electric lines.

More than a million miles of Alcoa A.C.S.R. are now in service as proof that you can depend upon it to deliver the goods. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pa.



477,000 cm A. C. S. R. operating at 132,000 volts is used on the Paoli-Enola (Harrisburg) section of the Pennsylvania Railroad

ALCOA A-C-S-R
ALUMINUM CABLE STEEL REINFORCED

TOPS THEM ALL

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AUTOMATIC STARTER *in the* RED PLASTIC CAN

Locks out deactivated, flickering, blinking lamps.

Resets automatically. No need to touch the starter.

Provides new economy in fluorescent lighting. Prevents overheating. Increases life of ballast. Saves maintenance and power costs.

Life of starter is many times greater than that of average lamp.

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In the NEW RED PLASTIC CAN STRONGER

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Higher Dielectric Strength
Listed and Approved by Underwriters' Lab., Inc.
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B.C. POWER COMMISSION STUDYING RESOURCES

Potential power resources on Vancouver Island will be investigated by the B. C. Power Commission as an initial step in the government's power program, it was stated recently by S. R. Weston, who has been named chairman of the power commission set-up by the B. C. Legislature at its last session.

Weston said the need for additional power was particularly urgent on Vancouver Island and that the most economical and otherwise suitable sources of power would be investigated by the commission immediately. While the Campbell River is possibly the best known of the potential sources on the island, the Nanaimo and Puntledge rivers, as well as several other possible sources of development, are being examined.

H. G. Acres & Co., Niagara Falls hydroelectric power engineers, have been engaged by the B. C. Power Commission to make a survey of the Campbell River and other Vancouver Island power resources. Weston said the commission had under consideration a general long-range plan for the improvement of the availability and supply of electrical power throughout British Columbia.

The commission has authority to develop new electric power plants, to take over existing plants and extend electrical service, subject to government approval; has a $10,000,000 fund.

OWU Allows Units for Far Western Plants

Recent OWU authorizations include new units for Albuquerque (N. M.) Gas and Electric Co. and for the Imperial Irrigation District in California.

The El Centro plant of the irrigation district will receive a 20,000-kw. unit and a 250,000 lb. per hour boiler under the authorization. The new unit will replace a hydro plant which the district was refused permission to build at the Pilot Knob site on the All-American Canal.

A 7,500-kw. turbo-generator for Albuquerque Gas and Electric will be transferred from a station built to serve the Lake Charles, La., magnesium plant of the Defense Plant Corp.

● UTILITY ACCOUNTANTS of the Northwest Electric Light & Power Assn. held their annual conference in Boise, Idaho, June 12 and 13, with headquarters at the Owyhee Hotel. J. H. Rogers, Idaho Power Co., chairman of the Accounting and Business Practice Section of the association, conducted the sessions.

B.C. ELECTRIC PLANNING BRIDGE RIVER DEVELOPMENT

Initial plans of B. C. Electric Railway Co. for the first major installation at its Bridge River hydroelectric power development have been announced by Thomas Ingledow, vice-president and chief engineer. Ingledow stated that the company has engaged the Shawnigan Engineering Co. to make further surveys, general designs, drawings and write specifications on equipment for the installation.

The engineering work, which will be finished within a year, will cover primary development of a total of 133,000 kw., which will be made up of three 45,000-kw. generators supplying power to the Lower Mainland area over twin 220,000-volt transmission lines carried on steel towers. This will raise the present total installed capacity of the company's plants on the Lower Mainland to 318,000 kw.

It is estimated that the cost of complete installation of the three 45,000-kw. units will approximate $17,000,000.

When fully developed, the capacity of the Bridge River project will be 600,000 kw., one of the largest single hydroelectric developments on the Pacific Coast.

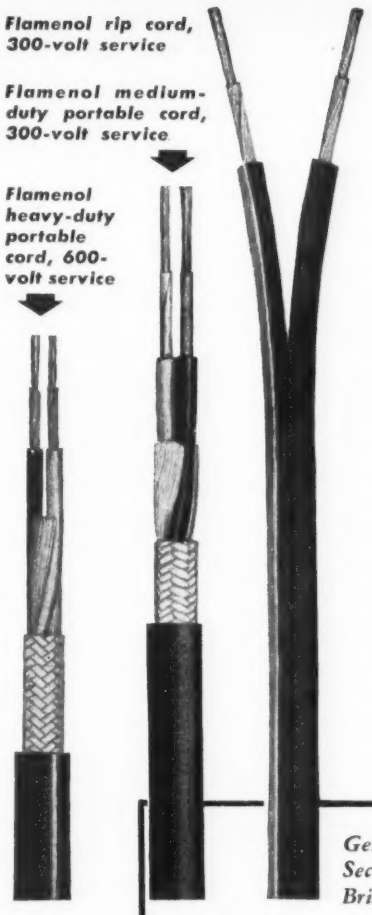
Construction of the first units at Bridge River will take approximately three years under normal peacetime conditions. Until such time as the first units can be brought in, B. C. Electric expects to obtain such supplementary surplus as it may need from surplus power in Washington.

Ross Dam Completion Date Extended to June 1946

Extension of the completion date for Seattle City Light's Ross Dam power project to June 1946 was granted contractors in mid-May by the municipal Board of Public Works. Delay of one year before electrical energy will flow from the development on the Skagit River in northwestern Washington was necessary because of manpower shortages and a high labor turnover.

Disposal of millions of feet of marketable timber in the Skagit Basin which will be covered by Ross Dam Lake was still a question for city officials. One bid for the timber had been received.

● APPLICATION has been filed by the Washington Water Power Co. for a permit to reconstruct overhead transmission lines across the Columbia River south of Chelan, Wash. The application was filed with the Army engineers in Seattle and involves only minor construction.


Flamenol rip cord, 300-volt service
Flamenol medium-duty portable cord, 300-volt service
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Here are tough, sturdy cords for use for every purpose in power plants, industrial plants, machine shops, service stations, garages, packing houses, mines, etc.

Three cords are available: Flamenol heavy-duty cords for use where conditions are severe; Flamenol medium-duty cords for use where conditions are less severe; and Flamenol rip cords for use with lamps, fans, etc.

Both the insulation and jacket of these cords are made of long-life thermoplastic compounds. These compounds are resistant to water, oils, acids, alkalies and sunlight. Flamenol cords can be depended upon to give long, trouble-free service.

For further information see the nearest G-E Merchandise Distributor or mail the coupon for folder.

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BUY WAR BONDS AND HOLD THEM

General Electric Co.
Section W651-18, Appliance and Merchandise Dept., Bridgeport, Conn.

Sirs: Please send me your Flamenol Cord folder.

Name.....

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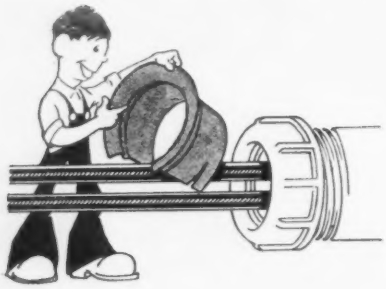
City.....*State*.....

GENERAL ELECTRIC



T&B INSULINER* SLEEVES Instantly Convert Any Cable Outlet Into a Code-‡ Approved Insulated Bushing

Here's how: Simply squeeze the two ends of the Insuliner Sleeve together and snap into place. You can install it before or after fishing, or right over the wires in old work. Inexpensive T&B Insuliner Sleeves come in all sizes, $\frac{1}{2}$" to 6". For any standard conduit or EMT outlet. Patented. Approved by Underwriters Laboratories.

With Insuliner Sleeves in stock, your present conduit bushing stock will immediately service any insulated bushing requirement.

Under the T&B Plan, Insuliner Sleeves, like all other T&B wire fittings, are sold exclusively through the service organizations of T&B Electrical Wholesalers.

Get in touch with them or with any of our conveniently located offices today for Insuliner Sleeve Bulletin S-5.

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UTILITY TAX VALUATION INCREASED IN OREGON

Tentative valuations of electric utility companies in Oregon for tax purposes have increased by $1,400,000 in 1945 over 1944, as announced by the State Tax Commission. The total valuation for tax purposes in 1944 of all the electric companies operating in the state was $111,406,000. The new valuation found by the Tax Commission is $112,801,000.

All other utility groups likewise show increased valuations except heating companies and small telephone companies. The total increase for utilities in all categories was $12,000,000.

Oregon Group Moves to Create Utility District

First formal step in a new move to form a people's utility district in western Linn County, Ore., were taken the first of May when a preliminary petition was filled with the Oregon Hydroelectric Commission.

Proposed boundaries of the district would enclose 900 square miles of property valued at $20,000,000 and populated by about 23,000 persons. Excluded would be the towns of Albany and Lebanon which voted heavily against formation of the PUD in 1939 —the third unsuccessful election.

● In a Two To One Vote, Benton County (Wash.) PUD commissioners recently approved a resolution calling for condemnation of Pacific Power & Light Co. properties in the district. At the same time the commissioners tentatively approved a $850,000 bond issue and the hiring of engineers and attorneys. The dissenting vote was by the chairman, who expressed himself in favor of a public vote on the question. Benton County electors cast an 856 vote majority against Referendum 25 in the November election.

● FPC has issued a report by Percy H. Thomas on preliminary results of a survey to determine the potentialities of the wind as a source of electric energy. The investigation was based on Weather Bureau records and, according to the report, indicates suitability of such a supply for utility work. Thomas has designed wind turbines for a 7,500-kw. and a 6,500-kw. unit.

● C. A. Powel, AIEE president and manager of the Westinghouse headquarters engineering department, was at Denver May 18 to address the thirtieth anniversary meeting of the local section AIEE. Speaking on *The Engineer and His Future*, Powel cited achievements of the 60 years since the institute was founded and stressed the importance of encouraging young men to adopt the engineering profession. Not only the more recent discoveries and applications require further development, many of the older problems still present obstacles, he pointed out, and warned against conditions that might hamper the young engineer in applying his talents to their solution.

● An unusually large meeting of the Vancouver Electrical Assn., the electrical contractors group in Vancouver, B.C., was held recently in that city for an educational presentation by T. C. Clarke, of Northern Electric Co. Ltd. Clarke presented details of wartime developments by his company and their application to private business with the return of peace. V. Fouracre also demonstrated various types of fire alarm systems and showed new developments in high fidelity sound reproduction.

A light metals conference will be held June 21 and 22 at the Seattle Chamber of Commerce under auspices of the Western States Council of the chambers of commerce. The meeting is to analyze the possibilities for development of light metals industries throughout the West following the war. With large plant facilities and production capacity the interest will focus on fabricating plants and assembling and processing of light metals as substitutes for heavier metals in Western manufacture.

WANTED

Sales Engineer for San Francisco Office of eastern electrical wire manufacturer should have Utility experience in Transmission and Distribution. State age — education — experience, and salary desired. Box 100, Electrical West, 68 Post St., San Francisco 4, Calif.

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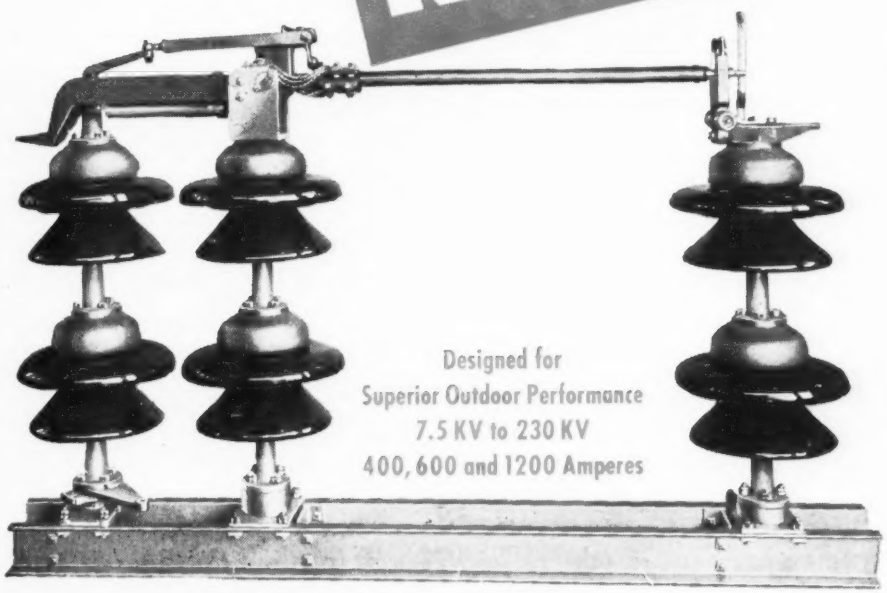
here's the PACIFIC ELECTRIC SWITCH TYPE TW

Blade Correctly in Position . . . before it

ROTATES IN AND OUT OF HIGH-PRESSURE CONTACT MAKING OPERATION EASY



1. Blade in partial open position.
2. Switch blade coming into position.
3. Closed position. Blade rotated to apply contact pressure. Strong springs apply full pressure over a wide range of contact deflections.

C. H. Cutter, 1015 Securities Bldg., Seattle 1, Wash. — J. E. Redmond Co., 448 W. Madison St., Phoenix, Ariz.

Myron Swendsen, P. O. Box 156, Boise, Idaho — G. B. Kirkwood, 437 S. Hill St., Los Angeles 13, Calif.

Other Representatives in Principal Cities

For the most reliable performance at outdoor power stations, here is an especially-well-designed group-operated vertical-break switch for line, bypass, sectionalizing or circuit use.

When the switch blade swings into correct position, it rotates into a high-pressure hinged contact. Wiping action is sufficient, yet wear of silver inserts is negligible.

Tests show that this type of contact wears but 1/64-inch per 15,000 operations.

Under heavy ice conditions, this switch **progressively** fractures ice, starting with the operating handle, through the bevel-link drive to the rotating blade. In this way the mechanism is freed from ice before the opening or closing of the switch blade. The contact pressure is released by the rotation of the switch blade permitting easy opening under all conditions.

Other features include the simple design; toggle in closed position; anti-friction bearings; enclosed spring counter-balance for the blade on the larger sizes; and two easy adjustments, one for positioning the blade and one for rotating the blade.

For full details about this most reliable substation switch write today.

Pacific Electric Mfg. Corporation

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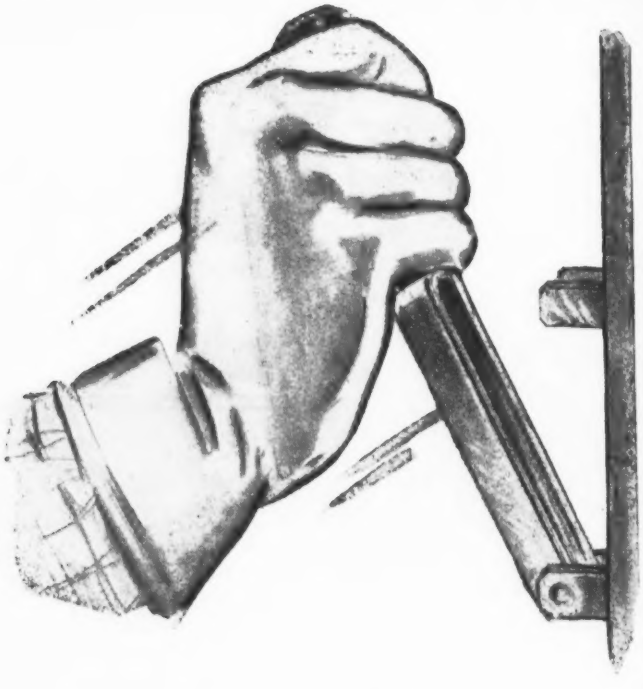

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Used to bring defeat to our enemies in Wartime will provide Better Living in Peacetime

Spurred by the emergency of war, business managed electric utility companies have provided increased power and broader distribution to meet the needs of war-expanded industry.

When Peace comes — this increased power, these greater distribution facilities—will not only turn the wheels of peacetime industry, but supply an ample surplus to provide in hundreds of thousands of homes (in cities, towns and on the farms) energy for the multitude of electrical devices that bring more comfort, more leisure, more cleanliness, more health—BETTER LIVING.

All members of this association, contractors, dealers, distributors, manufacturers and utilities — are planning now for the day when they can return to happy pursuits of promoting BETTER LIVING through the wider use of electrical appliances.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

418 SPALDING BUILDING PORTLAND 4, OREGON

RUSSIA AND AMERICA

ALLIES—or else . . .

VICTORY in Europe was won only through the combined endeavor of the United Nations. Only through sustained joint effort can the fruits of that victory be reaped.

Without disparaging the truly heroic contributions of others, three of the Allies may fairly be credited with having made the major contributions to victory over the European Axis—the United Kingdom, Russia, and the United States. The close accord of these three nations is no less crucial to the accomplishment of the tasks that remain.

First of these is the war against Japan. It still requires winning. Even without any help from others, the United States could make good this victory, but the war's duration will be speeded by the marshaled effort of the United Nations.

Next, and not less important, is the task of establishing a basis for enduring peace. In this struggle our enemies are more formidable than any we have faced—national ambitions, prejudices, suspicions and distrusts, the staggering burden of tradition and debilitating cynicism born of past failure, the cleaving wedges of divergent languages, thought patterns, economic creeds and procedures—an array of difficulties as baffling as fog and as formidable as a deluge. They can be vanquished only by a continuance of the working accord between the United States, Russia, and Britain that was forged on the anvil of European conflict.

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This high appraisal of the decisive importance of the Big Three in determining the destiny of the United Nations organization, in no way depreciates the importance of the role to be played by France, by China, or the other freedom-seeking nations represented at San Francisco. All of us are committed to the building of a genuinely representative security organization in the conviction that by such means alone can we possibly achieve a just and lasting peace. But the strength of any international machinery will depend upon the validity of Russian-British-American cooperation. If these three are able to achieve substantial harmony of aim and procedure, a world organization that includes them can operate with effective coherence. If they pull apart, the United Nations will break up into competing and jealously hostile blocs.

This is inevitable because of the sheer weight of these three nations in the world's affairs. Between them they account for perhaps half of the world's income and from two-thirds to three-quarters of its industrial output. Once Japan has been crushed, they will control an overwhelming preponderance of the world's armed might. Each of them will wield military power on a scale quite beyond the power of any embryo security league to hold in check. Only if all three are resolved to keep the peace and to enforce it through the Security Council, can that body hope to accomplish its aim.

Although there is a tendency on both sides of the Atlantic to indulge somewhat recklessly in mutual criticism, the ties between Britain and America are too firm to be severed by any foreseeable strain. But that has not been true of our relations with Russia. Even while fighting a war in which our respective ways-of-life were at stake, the inestimable services of each to the other were rendered as friendly but independent associates rather than as fully trusted partners. Now again, as we approach the difficult and vitally important task of building a world organization and of devising a European peace, the task of our delegates is complicated by national attitudes under which each hopes for the best from the other, while fearing the worst.

But the stakes for us both—and for the rest of the world—are too high to be played for in a diplomatic poker game. Russia has no inhibitions in demanding what she wants, and our own vital interests must be stated and upheld with undeviating firmness. Yet we both must face the stark fact that few advantages that either nation might gain at the cost of dissipating the good will of our wartime association could be worth the price thus paid.

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The first steps toward establishing confidence lie in a frank recognition of what may contribute to the lack of it and in a definition of what can be done to restore it.

1. *Probably the greatest single area of reciprocal distrust between Russia and our own country is based on the fear of each that the other may try to interfere with its domestic, economic, and political affairs.* Each purports to see the beam of meddlesome intervention in the other's eye, while it ignores the mote in its own. Thus the Soviet Union remembers that we participated in the foreign military intervention at the time of her civil revolution, and afterwards lent our support to successive boycotts of her trade, of her gold, and of her credit needs. For our part, we remember the Soviet Union's doctrine, and

aggressive support, of revolutionary international communism.

We feel that Russia should find satisfactory evidence of our present willingness to have her develop her internal institutions as she will in the aid that we have given her during the war, and in the record of our good-neighbor policy as applied to Latin America. She, no doubt, resents our lingering suspicions in the face of her declared policy of 1941 to refrain from any attempt to influence the political or economic structure of foreign nations. Certainly, each of us will need the repeated reassurance that can come only through sustained performance by the other in the years ahead. Meanwhile, much will be gained if each will give to the other's good faith the benefit of the doubt, while it scrupulously guards its own conduct to avoid even the appearance of backsliding.

2. *A second zone of suspicion is created by those measures which each of us interprets as natural and necessary bulwarks of national security when they are our own, but as evidence of dangerously aggressive imperialism when taken by the other.* In our view, at least, such demands as we have voiced for island trusteeships or for other naval bases appear mildly conservative as compared with Soviet claims for annexation of territory and for a general orbit of influence, under governments friendly to her, throughout eastern Europe in particular.

There can be no easy solution to that problem. Bi-focal vision, by which one nation can look through a second lens ground to the prescription of another, seldom is achieved in international affairs. The success of the San Francisco Conference will provide a mechanism for international definition of principles and procedures which at least might relieve the inevitable strains. Most important will be the record of how each of us proceeds in our respective courses of action. Soviet performance thus far is highly unsatisfactory to us. While we have taken pains to clear our procedure with her, she has taken action in the Baltic, in Austria, and in Poland without even advance notice to us.

A major test of our ability to cooperate may be found in the Allied administration of conquered Germany. The proposed four-headed control of a four-way partitioned nation promises to be at best an extremely awkward mechanism of administration. At worst, it can result in continuous and dangerous bickering between the representatives of Britain, France, the United States, and Russia in the Berlin coordinating center, and in hopelessly divergent procedures in their several zones of administration. There will be a compelling need for all of us to exercise all of the wisdom and cooperative resolve that we possibly can muster.

3. *A third testing ground for the future of American-Soviet relationships will be defined by the course of Russia in our continuing war with Japan. We are not unmindful of the toll paid by the Soviet Union in its magnificent European war effort. But we still are locked in a desperate struggle with an enemy that exemplifies the Fascism which America and Russia equally denounce. And that war is being fought in an area where Russian interests are importantly at stake.*

Russia has an extraordinary opportunity to create good will by throwing her weight speedily and effectively on our side. There is no doubt but that the final Pacific settlement will generate problems comparable with those of the European peace, but it is equally certain that the continuation of the European comradeship in arms can do much to promote an enduring and confident postwar friendship.

4. *A fourth, and highly important, potential source of suspicion and irritation is the intellectual blockade that the Soviet Union has maintained against the free flow of travel, intercourse, and exchange of ideas.* We can understand the genesis of this policy and the reasons for its continuance while Russia entertained a constant fear of attack by powerful enemies. But the sustained perpetuation of such a quarantine by so strong a nation as the present U.S.S.R. could not be accepted as a protective measure. Inevitably it would generate suspicion that it was rather an instrument of nationalistic isolation or even of contemplated aggression. A way-of-living, at arm's length, with a nation that maintains such intellectual quarantines is possible; any whole-hearted partnership of effort is quite impracticable.

5. *Trading between a free-enterprise nation and one that operates all foreign commerce as a government monopoly can give rise to many frictions.* That subject is too complicated for exposition here. Suffice it to say that, while difficult, it is not impossible to conduct such trade with mutual advantage. We are in a position to help Russia greatly with her program of industrial rehabilitation and expansion at great saving of cost in terms of her current scale of living. In return, we must have assurance that her government monopoly trading will be conducted for commercial rather than political ends, and that it will be used to encourage rather than to restrict multilateral and non-discriminatory world trade.

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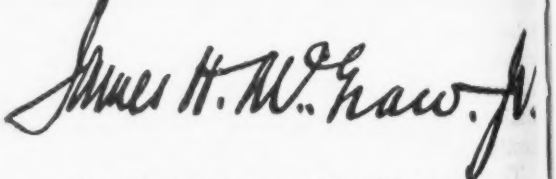
This is a representative list of the major areas in which misunderstanding and distrust may be generated, or allayed, in Russian-American relationships. No doubt, an equally honest list drawn by a citizen of the Soviet Union would be more heavily weighted by those features of our behavior which irritate and stimulate distrust on their side. If such a catalog were to be presented, it should receive our most searching and responsible consideration.

For it is of utmost importance that our two nations, in concert with the other United Nations, learn how to get along in mutual confidence and respect. Our understanding of each other now is so imperfect that our negotiations are punctuated with continuous irritations over *little issues*. This, inevitably, will continue until such matters are submerged in the general confidence that can be achieved only through satisfactory settlement of the *big issues*. We must succeed in this, or the defeat of Japan will merely mark the end of the Second in a series of World Wars.



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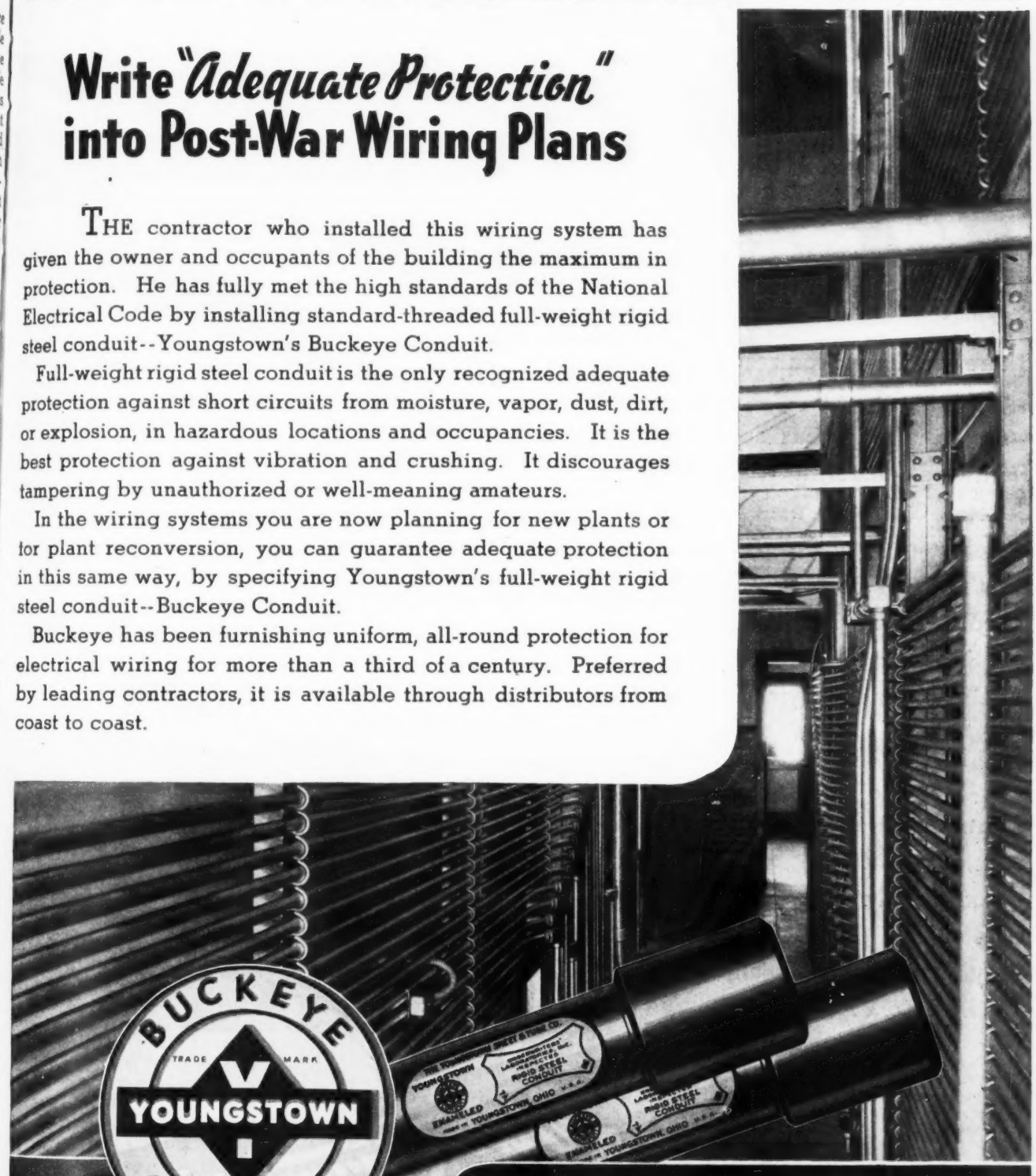

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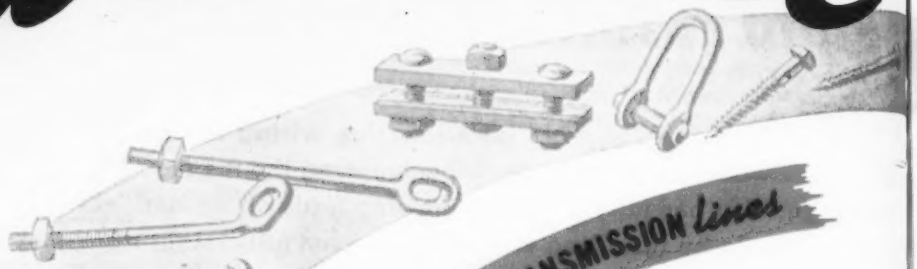

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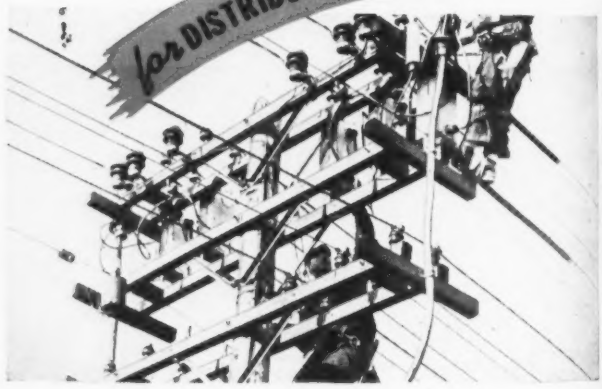

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STRIKE THREATENING IN SAN FRANCISCO AREA

Strikes among nearly 4,000 AFL electrical workers employed by Pacific Gas & Electric Co. outside the San Francisco Bay area still threatened late in May, following War Labor Board denial of an 18½% wage increase.

Members of the International Brotherhood of Electric Workers, who had voted to go out on strike April 19 but had acquiesced to military requests to postpone the walkout one month, were reported to be threatening strike action in several of the company's nine AFL divisions. Union officials were attempting to prevent a walkout.

Calling a strike first over asserted WLB delays in settling the wage increase issue, union members asked a rehearing when their 18½% general wage increase demands were denied.

The WLB stated that the union had presented no evidence which justified further increases under the Little Steel Formula. PG and E contended that it already had granted increases totaling 15%, the limit prescribed to compensate for rise in the cost of living.

Wage rates for 80 job classifications correcting intra-plant inequities, elimination of rate differentials for men and women doing the same work, correction of area differentials in salaries of clerical employees and shift premium were ordered by the board in settlement of other phases of the dispute.

Los Angeles Department Submits Fiscal Budget

Proposed budget of $65,885,000 for the municipal electric system in the 1945-46 fiscal year was submitted to the Los Angeles Board of Water & Power Commissioners on May 15. The figure includes an unappropriated balance of $18,874,000 and is a decrease of $1,549,000 from the 1944-45 budget.

Revenues from the sale of electric energy are estimated at $38,200,000 for the coming fiscal period. Expenditures include $18,805,000 for operation and maintenance, $7,096,000 for bond interest and redemption and $17,993,000 for capital expenditures.

● STATING that the majority of its preferred stockholders are now residents of southern Oregon, officials of California-Oregon Power Co. announced that its annual stockholders meeting would be held this year in Medford instead of in San Francisco. For 24 years, the stockholder meetings have been held in San Francisco, where original statutory offices were established. Statutory offices have since been moved to Yreka.

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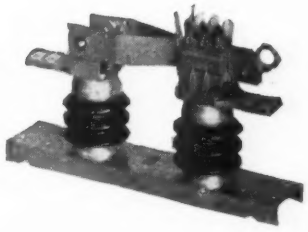

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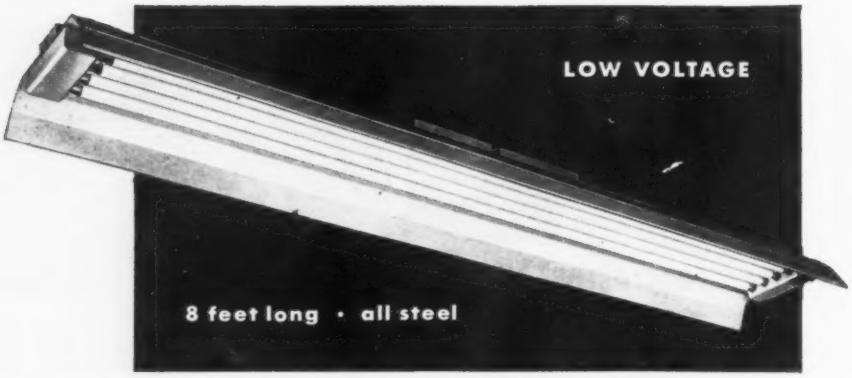

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P G and E Announces Personnel Changes

To fill vacancies created by retirement of H. B. Heryford and G. H. Rand, Pacific Gas and Electric Co. has announced appointment of Arthur D. Church as Stockton division manager and of Forrest U. Naylor as manager of the company's credit and collection departments. Both appointments are effective July 1.

Known to all his friends as "Jack", Heryford has been with PG and E and its predecessors for more than 42 years and has been manager at Stockton for 17 years. Rand started with the company in 1911.

Church started as clerk in the Bakersfield office of the San Joaquin Light and Power Corp. in July 1914. In 1917 he became district agent for the Midland Counties Public Service Corp. at San Luis Obispo and in 1920, following Army service, he was transferred to Santa Maria as district manager. In 1929 he was appointed sales engineer in the Fresno headquarters of San Joaquin Light and Power and later served successively as office assistant to the general manager and field executive. In 1940 he was made office assistant to the general manager of PG and E, with headquarters in San Francisco.

Naylor, who has been administrative assistant in the public relations and sales department, joined PG and E in 1921, following graduation from the University of California in mechanical engineering and commerce. He has served as salesman first at San Rafael and then at San Jose, as manager of gas sales and has been an administrative assistant since 1939.

● E. V. Noe has been appointed acting chief of the bureau of specifications and estimates, department of engineering, PG and E, to replace F. E. Baxter, who assumes the duties of engineer on the general manager's staff.

● Fred P. Hanson will retire as manager of PG and E.'s purchases and stores department on Aug. 1 and will be succeeded by Frank R. Sherwood, assistant manager.

● James L. Brown has been appointed a district representative for G-E's electronics department, tube and specialties divisions. With headquarters in Los Angeles, he will cover southern California and Arizona.

Peterson Promoted by Los Angeles Department

Promotion of William S. Peterson to assistant chief electrical engineer was announced May 9 by Samuel B. Morris, general manager and chief engineer of the Los Angeles Department of Water & Power.

Peterson succeeds Charles P. Garman, now head of the power system. He was graduated in electrical engineering in 1917 from the University of California and worked for General Electric Co. and the Anaconda Copper Mining Co. before joining the Los Angeles Department of Water & Power in 1922.

He is known for work in connection with design of the three 287,500-volt transmission circuits from Boulder Dam to Los Angeles. He engaged in high-voltage research, conductor vibration, line stability problems and general transmission line design from 1926 through construction of the third circuit in 1940. Since December 1943, he had been head of the design and construction division of the power system.

● ROLAND GRAHAM, member of the Vancouver, B. C., firm of the Graham Electric Co., Ltd., is now back in Vancouver, after spending five years in Ottawa where he was in charge of the electrical plans and specifications for army camps and buildings. Graham left Vancouver for Ottawa in January 1940, to serve in the directorate of Works and Construction of the Department of National Defence (Army). His work consisted mainly of design and layout of lighting and power installations for army buildings, together with plans for substations and distribution systems.

● JOHN LUCIAN SAVAGE, who designed Boulder, Shasta and Grand Coulee dams, has retired as USBR designing engineer following 34 years on the staff. Savage has been chief designing engineer for the bureau since 1924 and has drawn plans for more than a billion dollars worth of dams. He recently returned from a special mission to China and India and has been on an inspection trip in the Pacific Northwest.

● KENNETH B. ALDRICH, transmission development chief of the Bonneville Power Administration, has been transferred temporarily to the United States Department of the Interior, power division, to conduct market and transmission studies in connection with generating plants authorized for construction in eastern states, it was announced late in May.

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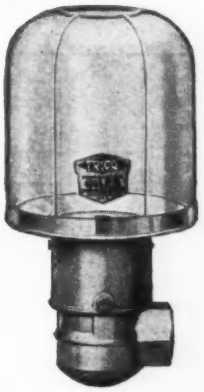

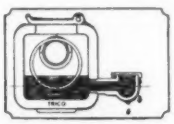

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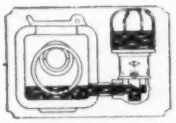

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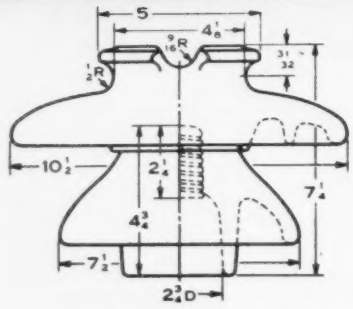

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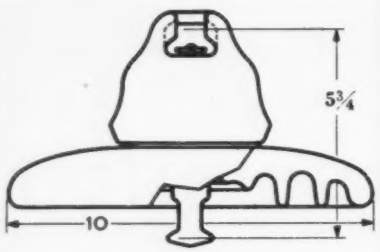

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Rosenberg Attends NISA Meeting in Chicago

T. L. Rosenberg, director until 1947 for Region 14 of the National Industrial Service Assn., attended a board meeting of old and new directors April 16-18 at LaSalle Hotel, Chicago. Discussed was the possibility of holding regional meetings. The Bay Cities Chapter, NISA, held its annual meeting and elected officers April 1 at the home of M. J. Lamperti, San Rafael. William E. Boyd, Pacific Electric Motor Co., was elected chairman; Clarence Lindstrom, vice-chairman; and Keith M. Noble, secretary-treasurer.

● A. L. Perdue has been retired from active service with the Navy and has joined the staff of the Oliver Iron & Steel Corp. as northern California district representative. Perdue formerly was lighting specialist in the area for Westinghouse and for 15 years previous to that was with Pacific Gas and Electric Co. In the Navy from 1919 to 1923, he joined again in June 1942, and, as commander of an LST, saw action in the Pacific.

● J. F. Ward has been reappointed Puget Sound manager by the Bonneville Power Administration, replacing Paul W. Hand, who resigned to take over managership of the Okanogan PUD. Ward was manager of the district from 1940 to 1943, when he was transferred to the executive office of the President, committee for congested production areas, with headquarters in Seattle.

● John F. Gogins, General Electric Co. representative in Spokane, has been appointed chairman of the economic development committee of the Spokane Chamber of Commerce, according to announcement by Earl H. Braden, president of the chamber, and Kinsey M. Robinson, district chairman for the Committee on Economic Development and president, Washington Water Power Co.

● Damon Trout, owner of Marine Electric Co. of Portland, recently was re-elected president of Electrical Construction Co. by the board of directors. Other officers named are Stanley Adams, vice-president and general manager, Clyde Ritter, secretary, and Albert T. Kemmer, treasurer.

● Samuel Moment, chief of Bonneville's market analysis section, has been appointed temporarily to the Surplus Property board. He will conduct studies of economic and marketing problems relating to government owned aluminum plants.

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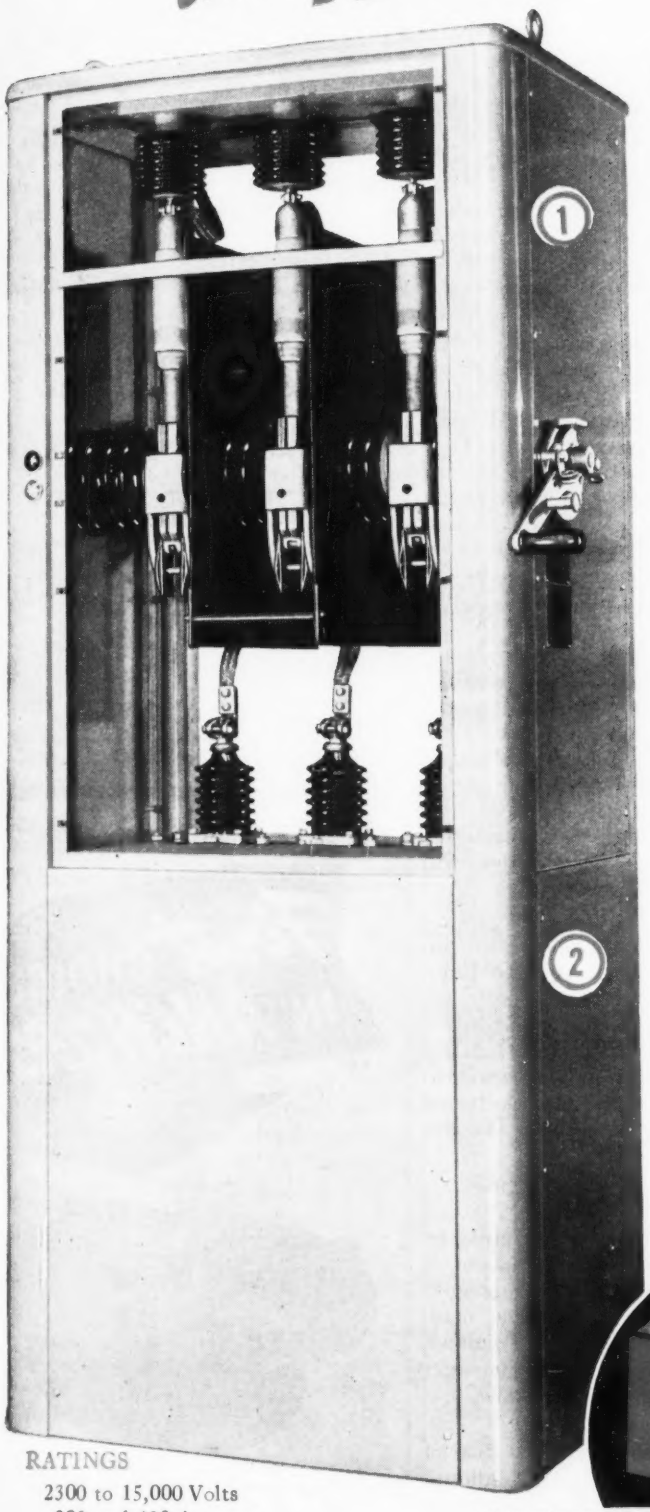
SERVICE REPRESENTATIVES IN ALL WESTERN STATES

CHECK the FACTS on DISTRIBUTION CIRCUIT *Interrupters*



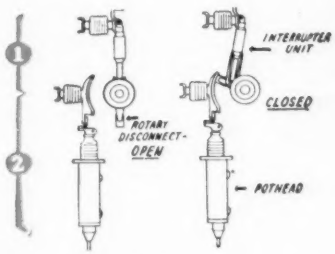
RATINGS
2300 to 15,000 Volts
200 and 400 Amperes

APPLICATIONS—

- In combination with fuses, to provide an economical means of fault protection and isolation for maintenance.
- To isolate transformer banks, instead of oil switches or expensive circuit breakers.
- For transfer or removal of load on energized distribution circuits.
- As a sectionalizing switch in feeder circuits.
- As an ordinary disconnect to provide safety in case of operating error.
- For interrupting exciting load currents of feeder regulators and capacitors.
- For changing transformer connections, star to delta or vice-versa without opening primary feeder.

CONSTRUCTION—

- Sturdy all-welded steel housings.
- All porcelain insulation.
- Floor, wall rack or transformer mounting.
- Available with conduit, through bushing, stud or pothead connections.



Arcs quenched in interrupter unit chamber when current is interrupted—then rotary disconnect establishes open gap.

R&IE

INTERRUPTER SWITCHES

The Check List

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

•

DISCONNECTING SWITCHES
INDOOR AND OUTDOOR

•

AIR BREAK SWITCHES

INTERRUPTER SWITCHES

•

CUTOUTS AND THERMO-RUPTERS

•

SWITCH OPERATING MECHANISMS

•

SUBSTATIONS

•

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

•

KIRK INTERLOCK SYSTEMS

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AUTOMATIC SECTIONALIZING EQUIPMENT

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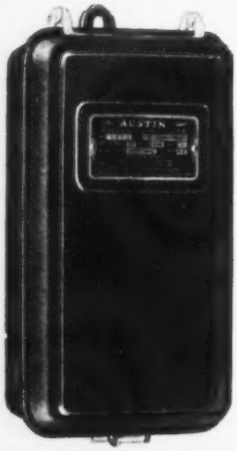
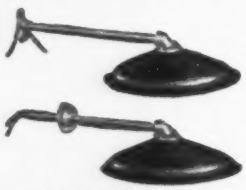
AUSTIN

Everything Electrical for Farm Wiring

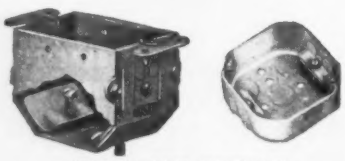


POULTRY HOUSE LIGHTING TIME CONTROLS

ELECTRIC FENCE CONTROLLER



YARD LIGHTS



BOXES AND FITTINGS

Install *The Austine Line*

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ELECTRIC FENCE CONTROLLERS
YARD LIGHTS AND R.E.A. WIRING
BOXES AND FITTINGS

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PACIFIC COAST REPRESENTATIVES
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H. M. POMEROY, 1004 East 4th St., Los Angeles 13, Calif.
W. W. WHEAT, 560 1st Ave. South, Seattle 4, Wash.

● Dr. A. Pen-Tung Sah, president of the National University of Amoy, China, is acting as visiting professor of electrical engineering at Stanford University where he is teaching a class in alternating current machinery to soldier-students enrolled in the Army Specialized Training program, it was announced recently by President Donald B. Tresidder. One of six Chinese educators invited by the Department of State to visit America as part of a cultural cooperation program, Dr. Sah is a graduate of Stanford and received the D.Sc. degree from Worcester Polytechnic Institute in Massachusetts.

● Harry L. Palmer, industrial control engineer for the General Electric Co., spoke recently in Spokane before the American Institute of Electrical Engineers and also before the Construction and Industry Committee of the Spokane Chamber of Commerce. Palmer's topic was electronics and their use in the inspection of metal material for imperfections and the detection of pin holes in tin cans.

● John J. Hayes, with Westinghouse in Seattle for many years, has been appointed Pacific Coast district treasury manager for the company. Since 1935 he has been in the Chicago office as northwestern district treasury manager. Previously he was at Seattle, first as office boy and then in the treasury department. His new headquarters will be at San Francisco.

● To Serve a large territory, including the states of Wyoming and Colorado, Rex L. Munger has been appointed middle west representative for Communication Measurements Laboratory. One of his duties will be to dispose of surplus radio and electronic materials of all types for the Defense Supplies Corp.

● H. L. Vincent and H. A. Dunlap have been transferred to new posts by Westinghouse Supply Co. Vincent is now at Spokane as branch manager, while Dunlap, former Spokane manager, has been moved to Portland. Vincent has been assistant manager and purchasing agent at Spokane.

● H. E. Bailey has been made district utilities manager for Westinghouse Supply, with headquarters in Seattle. Bailey moves to Seattle from Butte, where he was with Westinghouse Supply and its predecessor, Fobes Supply.

● Stuart R. Mudge has been named General Electric representative in northern California for power equipment manufactured by the company's apparatus department.

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●

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Give Better
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Write for latest Everstick bulletin.

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● FRANK HELDERLE is now Western territorial manager for the Stewart-Warner Corp.'s radio division, with headquarters in San Francisco. From 1934 to 1937, Helderle was distributor salesman on the West Coast for Stewart-Warner refrigerators and radios and from 1937 until 1941, he was district manager of the territory. Recently he has been special factory representative on the Coast for the company's heater division, in charge of field sales and service of aircraft heaters.

● W. MOTT, of Mott Electric, New Westminster, B. C., is a man of many roles. He is head of the electrical firm, mayor of the city and recently was promoted from the rank of lieutenant to that of captain in the reserve army. He is now the officer commanding the Ninth Fortress Signal Unit at New Westminster. Captain Mott served overseas during the last war.

● ARTHUR H. HALLORAN has been appointed Western editor of *Electronic Industries*, published by Caldwell-Clements Inc. A specialist on radio, he has served during the war as U. S. Signal Corps pre-radar instructor at the University of California and has been consultant in ultra-high frequencies at the Harvard University radio research laboratory.

● GRAYBAR has named P. V. Black as Pacific district operating manager, with headquarters in Los Angeles. Black has been with Graybar in the Denver accounting department, in Kansas City, New York and, since June 1944, as acting district operating manager at Los Angeles.

● ENRIQUE ELGUETA, chief hydrological engineer of the Corporacion de Fomento, an agency of the Chilean government, will visit power developments in the Pacific Northwest this month during a tour which also includes Nevada, Arizona and California.

● R. RATHLEF is carrying on the electrical business at Nanaimo, B. C., formerly operated by his father, the late J. Rathlef. Present activities of the company are mainly in industrial maintenance work. The firm is now actively engaged in the industrial wiring field.

● L. H. ASPINWALL, for the past ten years chief clerk of the Spokane division of the Washington Water Power Co., has resigned to become associated with Murphy Favre Co., investment firm.

● C. C. Cox has been appointed to the Joshua Hendy executive staff, as assistant to A. A. Browne, manager of engineering and sales. Headquarters of the company are at Sunnyvale, Calif.

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IDEAL "WIRE-NUTS"
(Solderless, Tapeless Wire Connectors)

STRIP WIRES, SCREW ON— THAT'S ALL!

The new low prices still further reduce the cost of making wire joints in wiring of factories, buildings, homes, etc.

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The States Company
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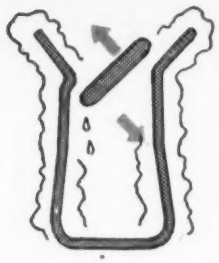
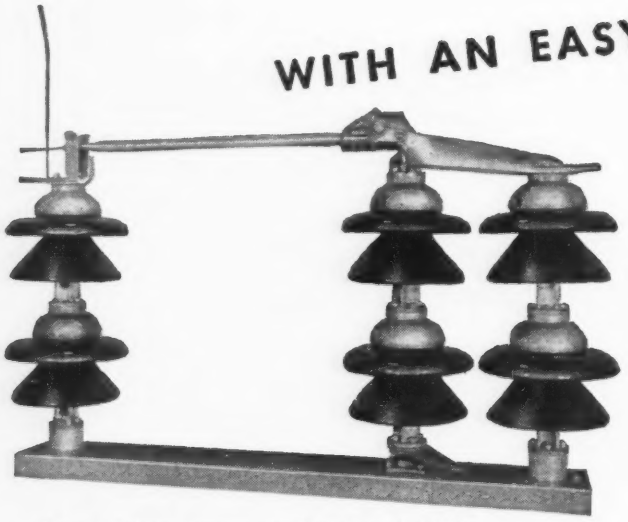
Electroline
Wire Rope Fittings

CONTACTS GET A break...

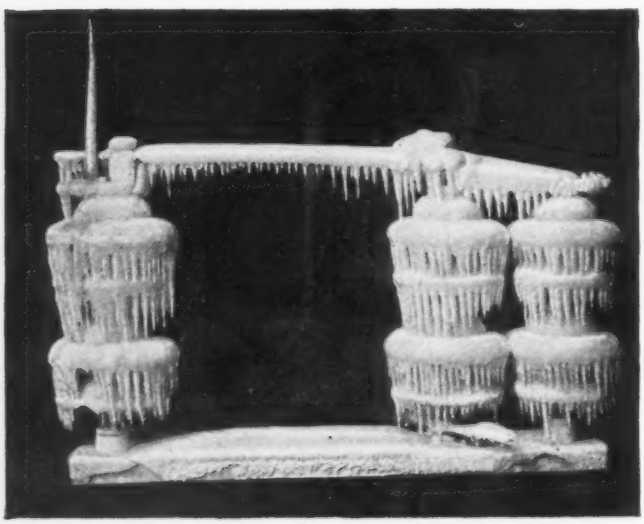


WITH AN EASY lift..



Type V Outdoor Disconnecting Switch rated at 600 amperes, 69 kv.

This laboratory view shows a full ice coating on high voltage Type V Disconnect before contacts were opened.



results:

- easier operation
- longer contact life
- lower maintenance

The new Westinghouse Type V Outdoor Disconnecting Switch gives contacts a "break" two ways: (1) Contact arm rotates to break any ice or corrosion seal before it starts to lift clear. (2) Contacts get a "break" . . . a longer life because contact pressure is completely released before the vertical break is started. A one-piece break jaw of beryllium-cobalt copper eliminates need for additional back-up springs.

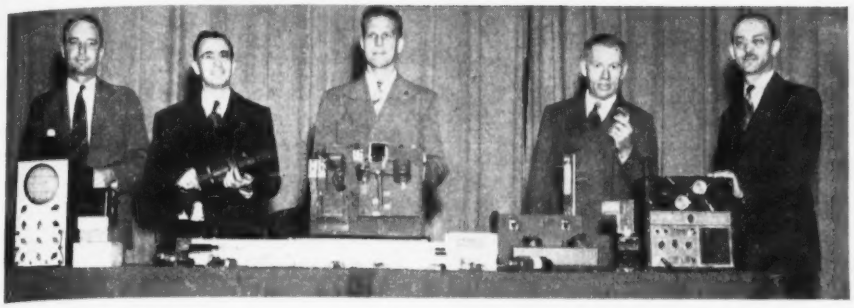
With only three moving parts, every stage of operation is positive and simple. A cam arm operating inside the housing controls every movement. Effort required to open or close the switch is practically uniform for all positions.

There are no shunts to corrode or break, no gears to maintain, no exposed links or levers to cause corona. Results: Lowest maintenance.

Ratings are from 7½ to 230 kv, 400 to 2000 amperes. For complete information, write for Booklet B-3480. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60578

Westinghouse

TYPE V OUTDOOR DISCONNECTING SWITCH



Members of Calectric Committee arranging the electronics program from left: Fred Oldendorf, assistant to the president; A. F. Ayres, protection engineer; Roy Misenhimer, commercial engineer; W. T. Johnson, assistant general superintendent; C. N. Parker, underground engineer. Four sessions were conducted

Electronic Applications Feature Employee Meetings

Practical applications of electronic devices which the postwar period may bring were presented to employees of California Electric Power Co. in employee information programs arranged by the electronics subcommittee of the company's postwar planning committee. Four meetings held at different points on the system drew an attendance of 350.

Cashiers, servicemen and others frequently are faced with questions from customers relative to electronic devices, and the program was planned as an aid in answering these queries. Information and education were considered of first importance, according to the committee, but the program was arranged as an entertainment. Information was introduced in a manner to make it useful to all employees, whether or not they possessed technical knowledge.

● Ross B. Hammond, prominent Portland businessman, is the new member of the board of directors of Portland General Electric Co., selected to fill the vacancy caused by the death of Amedee Smith. Hammond is president and general manager of the Ross B. Hammond Co., construction company. Born in Pittsburgh, Penn., Hammond studied civil engineering at Carnegie Institute of Technology, was graduated in 1909, and was employed as an engineer by the Pittsburgh Railway Co. He moved to Oregon and in 1923 founded the Portland firm which bears his name.

● Frank S. Thomas, for many years superintendent of the wiring department of the Valley Electrical Supply Co., Fresno, retired in April of this year. Thomas, who began in May 1909, as an electrician for the San Joaquin Light & Power Corp., transferred to Valley Electric in 1911 and in 1913 became its foreman. In 1916 he was made superintendent and continued in that capacity as long as the wiring department was maintained. In October 1936, he was made a supervisor for the company and had particular charge of the repair department. An active participant in local contracting circles, he has been a member of the Fresno Contractors Assn. throughout the years.

● Homer A. Morton, for many years with Montana Power Co. at Great Falls, Mont., has joined the Corwin & Co., Inc., consulting engineers and architects, as chief electrical engineer and has headquarters at 413 Medical Arts Bldg., Great Falls, Mont. This engineering firm is active in city planning and city improvement in the Northwest.

● Gerhard Mauric recently became chief engineer for the Electrical Engineering and Mfg. Corp. of Los Angeles. He has been responsible for development and design of special electric motors and drives for special industrial requirements and for the armed services.

● Ken Kissick has been appointed temporary acting manager of the Las Vegas (N. M.) Light & Power Co., following the death of E. A. Bradner. Kissick is president of Trinidad (Colo.) Electric Transmission Railway & Gas Co.

● Roy M. Smith, former Westerner, has joined the engineering staff of the Railway and Industrial Engineering Co., Greensburg, Penn., in charge of distribution engineering. He formerly was employed by Pacific Electric.

● Eric Johnston, president of Brown-Johnston Electric and Columbia Electric Mfg. companies of Spokane, has been elected to his fourth term as president of the United States Chamber of Commerce.

L. F. Van Houton, public relations director for the Washington Water Power Co., has joined the Army.

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ALL the strength and durability inherent in steel are combined---with definite economies---in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

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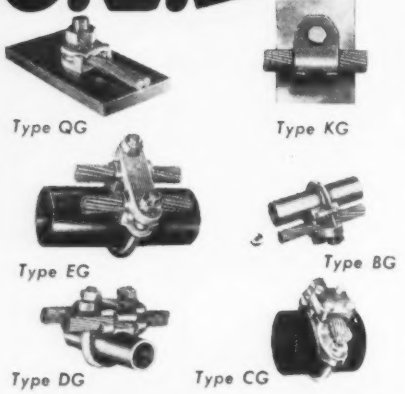
O. Z. GROUNDING DEVICES



These sturdy, corrosive-resistant, grounding devices ensure complete encirclement of the cable with a perfect grip, through a special, interlocking clamp feature. Simple to install, they make a perfect ground. For more information regarding the complete line of O-Z grounding devices and other electrical devices write for the 144-page O. Z. Catalog.

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TRADE *notes*

Murphy Joins Meier in Merchandising Service

A. B. Murphy, for the past 18 years with Westinghouse Electric & Mfg. Co. as district sales development representative of the Electric Appliance Department, has joined C. A. Meier in the firm of Meier-Murphy Co. with headquarters in the Western Merchandise Mart, San Francisco. Formerly known as the M. and M. Sales Co., it will continue according to the original plan to render a comprehensive merchandise service for the manufacturers of household appliances represented by it on the Coast. It will work through independent distributors in establishing retail outlets.

Murphy has been on the Pacific Coast for the past ten years and has supervised sales promotion operations in northern California, Nevada, Utah and Idaho.

The Meier-Murphy Co. now represents the Associated Products, Inc., of Akron, Ohio, manufacturers of the Akron line of electric ranges and water heaters for the home and the Kitchen King line of commercial electric cooking and baking equipment. This company recently took over the designs and patents and the production engineering staff of the Standard Electric Range Co., one of the pioneers in the electric range business. To augment the kitchen line, metal kitchen cabinets of the E. J. McAleer Co. will be handled by this company for Utah, Idaho, Nevada, Arizona and California. The commercial electric cooking equipment is now available for civilian use priority free, Murphy announced.

● A $135,000 CONTRACT for the manufacture of electric phonographs for the Navy has been awarded the Pacific Electronics Inc. of Spokane, according to Morris Willis, manager. Work will begin immediately and the equipment, which will be produced entirely in Spokane, will be used by the morale division of the Navy at overseas bases. This new contract brings the total war production work of the firm to more than $1,500,000.

● WESTINGHOUSE ELECTRIC CORP. replaces Westinghouse Electric & Mfg. Co. as the manufacturing company name, following recent action of the stockholders. The change was made for simplicity and brevity, it was stated.

● CONLON CORP. has announced representatives on the Pacific Coast. George H. Williams and Arthur C. Maryon will cover California, Nevada and Arizona and L. A. Robinson will cover Oregon, Washington and Idaho. Williams at one time owned an appliance and radio store in San Jose, Calif. and recently has been manager of the Signal Corps field production office in Los Angeles. Maryon went into the appliance business on the West Coast in the Bluebird era and later was RCA distributor in Oakland, Calif. Robinson has been a manufacturers' representative in Seattle since 1938, and will be joined in the business by his sons when they are discharged from war service.

● A SCHICK service station has been opened in Portland at the American Bank Bldg., 621 S. W. Morrison St., with Anton Brinks as supervisor. The Portland area formerly was serviced from the Seattle and San Francisco offices. Brinks, formerly manager at Seattle, recently received an honorable discharge from the armed services following a plane crash in the Pacific area.

● SPOKANE ELECTRIC SHOP at W 822 Sprague has been sold by its owner and operator for the last 16 years, Jess Ashlock, to Charles Morgan. Morgan has taken over the entire wholesale and retail business, including a substantial inventory of the merchandise. Spokane Electric is one of Spokane's oldest electrical businesses.

● SIGNED AS WESTINGHOUSE franchised dealers in California are the following firms: Sanger Home Appliance Co., 1305 Seventh St., Sanger; Tulare Hardware Co., 250 East Tulare St., Tulare; Massey-Morris Furniture Co., 145 East Pine St., Exeter; The Farmers Union, 151 W. Santa Clara St., San Jose; and Messick Hardware Co., 247 Main St., Salinas.

● INTER-MOUNTAIN EQUIPMENT CO., Boise, Idaho, has been made a distributor for Sylvania lighting products and will represent the manufacturer in Pocatello, Twin Falls and Boise. P. A. Dufford is sales manager for Inter-Mountain.

● HARVEY W. SMITH has joined Glenn-Roberts Co., manufacturers of transformer type arc welders and electronic components, at Oakland. He will head research and development activities.

● E. TULEY, electrical engineer of Vancouver, B. C., has registered his partnership in the business of the Tuley Electrical Machinery and Equipment Ltd.

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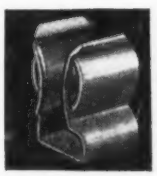

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Most value per dollar . . . most service and satisfaction. Figure it out . . . you're way ahead because ILSCO PRODUCTS are

12% cooler 50% lighter
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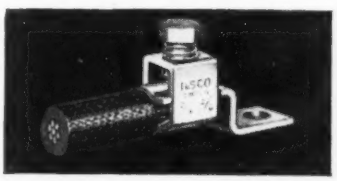

Write for 32-page illustrated catalog

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FOR MAN with home appliance dealer experience.

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HOME OFFICE in San Francisco Bay Area, but applicant should be free to travel.

AGE is unimportant—your experience and enthusiasm are the prime considerations.

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2127 PINE STREET · ST. LOUIS, MO.

Montgomery Electric Expands in Portland

Montgomery Electric Co., Portland, outgrowing its downtown facilities, has established a new warehouse and shop from which its wiring department and wiring stock will be handled. The downtown location will be retained as a store for electrical merchandise with the large basement which has formerly been used for the wiring department as additional display space for lighting fixtures and appliances. The engineering and public contact offices and the office for maintenance will also be at the downtown location at 1001 Southwest Fifth Ave., Portland. It is planned to carry a full line of electrical appliances as well as air conditioning and heating equipment. Because of the new warehouse, 3,000 sq.ft. will be released for the display area. As well as the appliances and lighting fixtures, a representative display of commercial and industrial equipment will be maintained. The prewar stock of appliances is sold out, and its fixture stock thinned down, but Montgomery Electric has been very active in electrical construction for many large war projects.

● Thermador Electric Mfg. Co. added 12,000 sq.ft. of space to its plant recently. Currently the space is being used for manufacture of 40-mm. ammunition boxes but the larger facilities are expected to be converted to handling of peacetime lines, among them electric ranges, water heaters, air heaters and other postwar products. Factory area now totals 130,000 sq.ft.

● Bendix Radio held a distributors' meeting at Samarkand Hotel, Santa Barbara, May 17-18, to outline merchandising distribution policies for the forthcoming anticipated resumption of civilian manufacture. Graybar representatives from throughout the Western states attended. Distribution will be largely through this organization.

● Fred C. Wood Co. has opened a branch office in the Brack Shops Bldg., 527 West Seventh St., Los Angeles, with Fred L. Lestoe in charge. Main office is in the Western Merchandise Mart, San Francisco. The company handles, among other lines, sun lamps, electric clocks and irons.

● The Okonite Co.'s Seattle offices have been expanded and moved to 1500 Northern Life Tower effective May 21.

● Frey & Krause, Los Angeles and San Diego, will distribute Lear home radios in the southern California area as soon as manufacture is resumed.

H. H. Van Luven
307 East 3rd St. Los Angeles (13)
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Manufacturers' Representative

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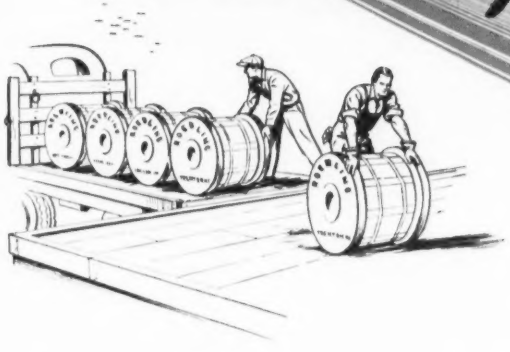

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PROFILES *of the month*

Phillip Stoltz, elected vice-chairman, turns over secretary-treasurer's books to Tone Gray, just elected, while new chairman Ross Manseau looks on. They were elected officers of the Electrical Maintenance Engineers Assn. of Northern California at the May meeting. John Hayes has been president of the group

When the Bureau of Radio and Electrical Appliances of San Diego County held its semi-annual conference (see p. 116) J. Clark Chamberlain, secretary-manager, (left) and William Powell, its president, (right) were pleased to be able to present Dr. Lee de Forest, (center) pioneer inventor of radio, to give his views on the future of television. Another feature of the conferences which dealers consider most valuable is the manufacturers' "bull session," (below) in which the manufacturers representatives sit in a group, facing the dealer audience, and answer questions and explain plans and policies. Secretary Chamberlain acts as interlocutor for this

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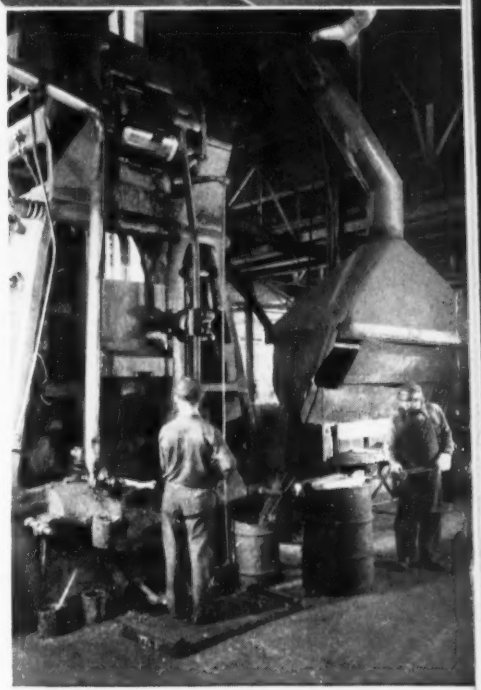
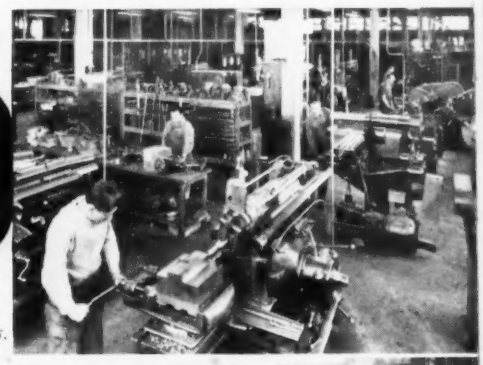
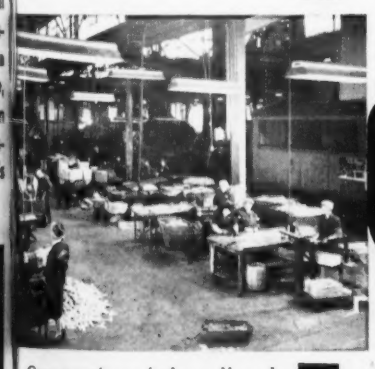


One of the large battery of giant drop-hammers.

A section of the extensive tool & die making department.





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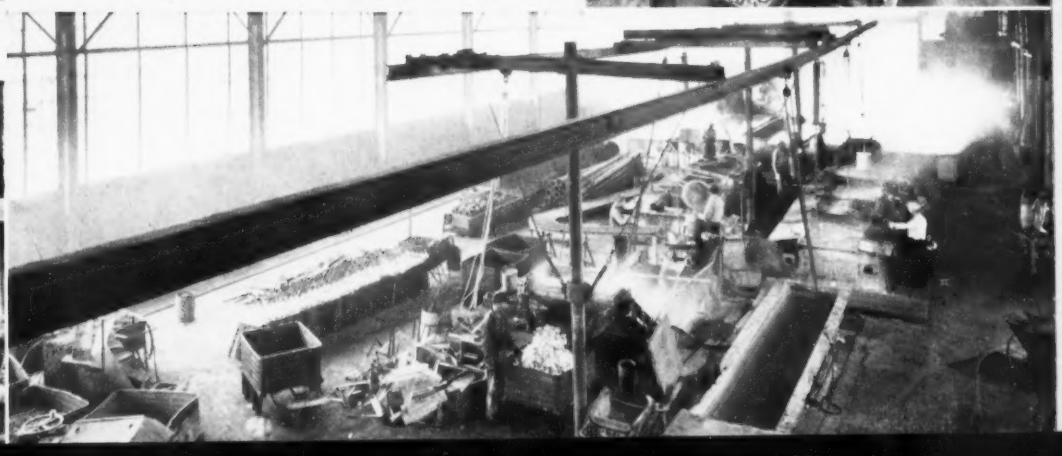

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Incomplete tallies of attendance show the following:

Number of Institutes held	48
Attendance Northern California Cities [San Francisco and Redwood City estimated; no report received from Taft.]	45,521
Attendance Southern California Cities [Fullerton, Santa Ana and Huntington Park estimated; no report received from Santa Barbara and San Diego.]	32,353

These figures prove the tremendous popular interest in home building and equipment. The courses included studies of Kitchen Planning. Adequate Wiring. Laundry Facilities and Home Lighting. The attendance record is a sure indication of the rising tide of postwar buyer demand for electric appliances.

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Published by McGraw-Hill Company of California

San Francisco

OCT 5 194

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